50 Hz

e-GS
Series

4" SUBMERSIBLE
ELECTRIC PUMPS

ErP 2009/125/EC

LOWARA

a **xylem** brand

CONTENTS

e-GS SERIES
HYDRAULIC PERFORMANCE RANGE AT 50 Hz

01724_A_CH

4" e-GS Series Submersible Pumps

LOWARA
a **xylem** brand

MARKET SECTORS
RESIDENTIAL, AGRICULTURE, INDUSTRY.

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

SPECIFICATIONS

PUMP
• **Delivery**:
  up to 21 m³/h at 2900 rpm.
• **Head**:
  up to 340 m at 2900 rpm.
• **Maximum pump overall diameter**
  (cable cover included): 99 mm.
• **Maximum immersion depth:**
  150 m (with 4OS motor).
  300 m (with L4C motor).
• **Maximum permissible quantity of
  sand:** 150 g/m³.
• **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 220-240 V,50 Hz.
• **4OS three-phase version**:
  from 0,37 to 7,5 kW 220-240 V,50 Hz.
  from 0,37 to 7,5 kW 380-415 V,50 Hz.
• **L4C single-phase version**:
  from 0,37 to 4 kW 220-240 V,50 Hz.
• **L4C three-phase version**:
  from 0,37 to 5,5 kW 220-240 V,50 Hz.
  from 0,37 to 7,5 kW 380-415 V,50 Hz.
• **Maximum supply voltage
  variations**:
  ±10% (4OS)
  ±6% (L4C).
• **Maximum number of starts
  for hour evenly distributed:**
  30 (4OS)
  40 (L4C).
• **Horizontal operation**:
  4OS up to 2,2 kW.
  L4C up to 7,5 kW.
• **Maximum temperature of water
  in contact with motor:**
  35°C

CONSTRUCTION CHARACTERISTICS
PUMP
• 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 or L4C
  motors.

MOTOR
For the motor features, please refer
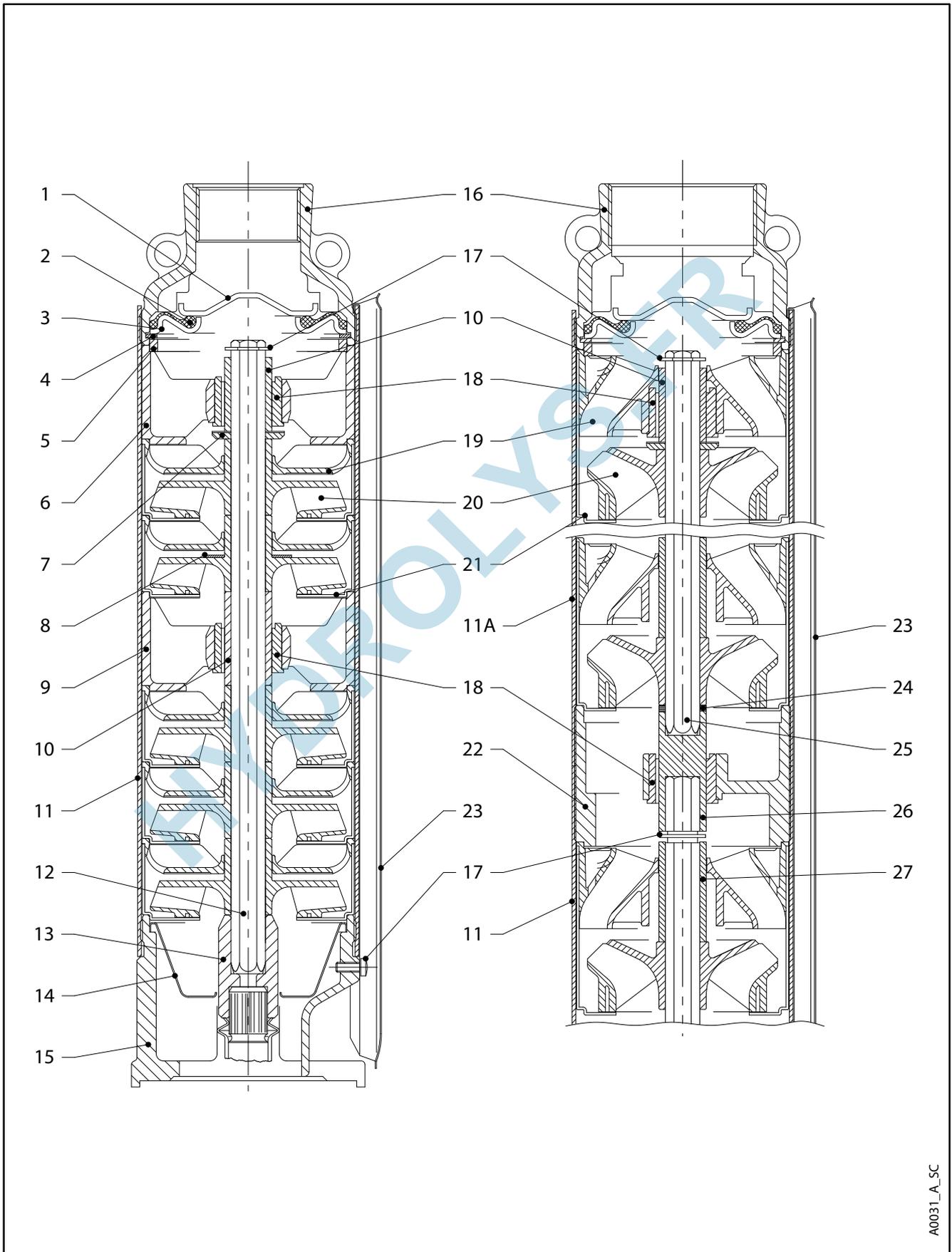to the specific technical brochures.

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

• **Abrasion resistant**

• **Floating impellers**

• **Compact**

• **Ecodesign
  compliant MEI ≥ 0,4**

• **Approvals:**
  - ACS
  - D.M.174/2004

e-GS SERIES
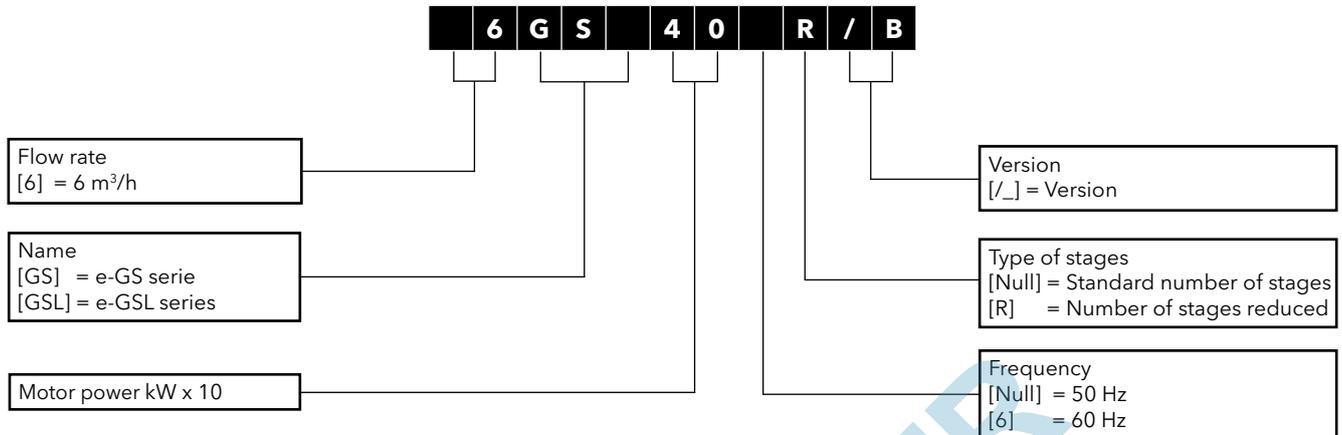# TABLE OF MATERIALS

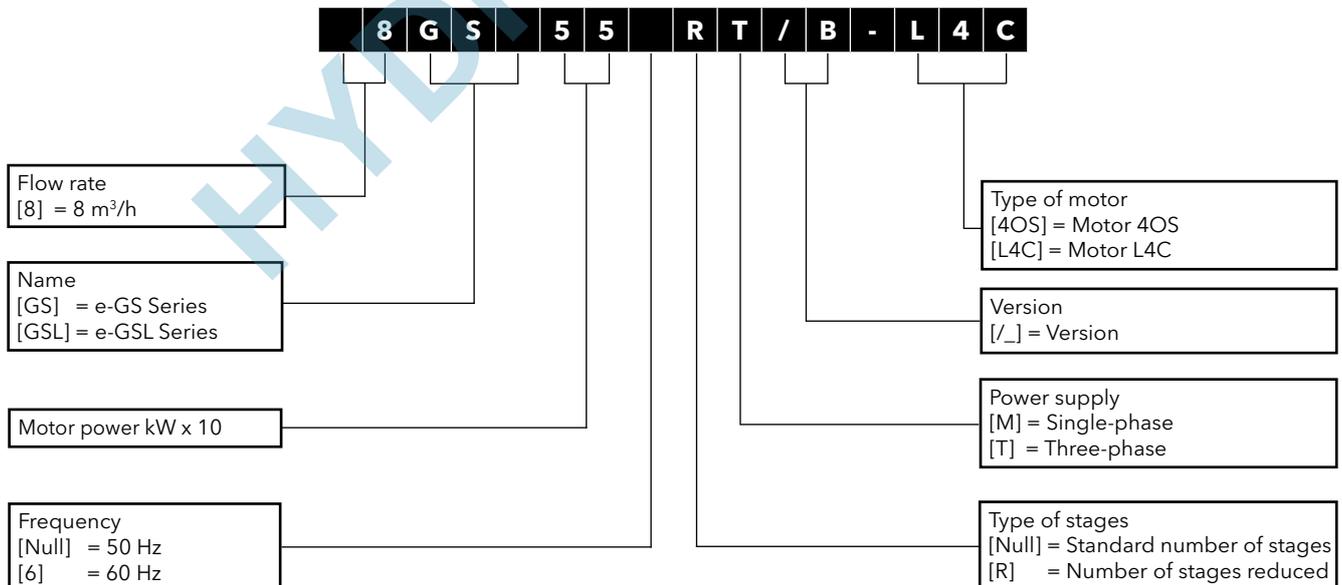| REF. N°	NAME	MATERIAL	REFERENCE STANDARDS	
			EUROPE	USA
1	Valve cap	Stainless steel	EN 10088-2-X5CrNi18-10 (1.4301)	AISI 304
2	Valve gasket	NBR		
3	Valve flange	Stainless steel	EN 10088-2-X5CrNi18-10 (1.4301)	AISI 304
4	Valve locking ring	Stainless steel	DIN 17006 - X5CrNi18-7 (1.4319)	AISI 302
5	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 | | R | / | B |

Flow rate
[6] = 6 m³/h

Name
[GS] = e-GS serie
[GSL] = e-GSL series

Motor power kW x 10

Version
[/_] = Version

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

Frequency
[Null] = 50 Hz
[6] = 60 Hz

EXAMPLE: 6GS40R/B

6 = Nominal flow 6 m³/h
GS = e-GS Series,
40 = Motor power 4 kW
Null = 50 Hz
R = Number of stages reduced
/B = version

e-GS SERIES
IDENTIFICATION CODE (ELECTRIC PUMP)

| 8 | G | S | | 5 | 5 | | R | T | / | B | - | L | 4 | C |

Flow rate
[8] = 8 m³/h

Name
[GS] = e-GS Series
[GSL] = e-GSL Series

Motor power kW x 10

Frequency
[Null] = 50 Hz
[6] = 60 Hz

Type of motor
[4OS] = Motor 4OS
[L4C] = Motor L4C

Version
[/_] = Version

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

Type of stages
[Null] = Standard number of stages
[R] = Number of stages reduced
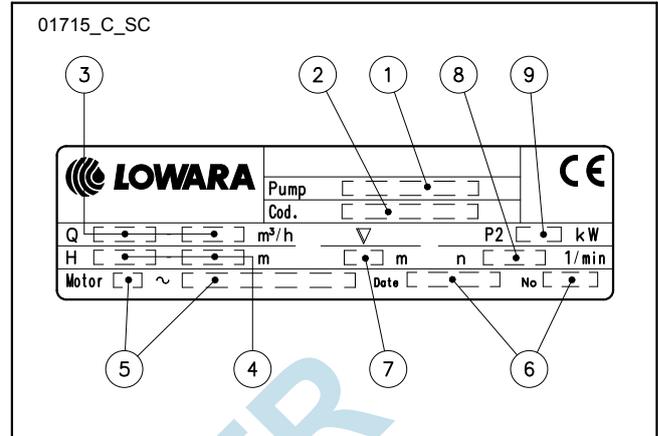
EXAMPLE: 8GS55RT/B

8 = Nominal flow 8 m³/h
GS = e-GS Series,
55 = Motor power 5,5 kW
Null = 50 Hz,
R = Number of stages reduced
T = Power supply three-phase
/B = version.

e-GS SERIES
RATING PLATE (PUMP)

01716_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
11 - MEI plate (Regulation (UE) n. 547/2012)

RATING PLATE (ELECTRIC PUMP)

01715_C_SC

REGULATION (EU) No. 547/2012 **MEI ≥ 0,40**

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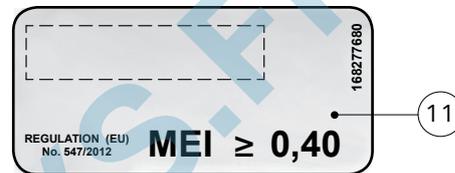
RATING PLATE
(SINGLE-PHASE MOTOR)

01718_C_SC

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

RATING PLATE
(THREE-PHASE MOTOR)

01717_C_SC

e-GS SERIES
PUMPS

With the "Energy using Products" (EuP 2005/32/EC) and "Energy related Products" (ErP 2009/125/EC) directives, the European Commission has established requirements for promoting the use of products with low power consumption.

Among the various products considered there are also some typologies of pumps with the characteristics defined by the specific **Regulation (EU) n. 547/2012** implementing the requirements of Directives EuP and ErP.

For vertical multi-stage pumps (MS-V for the Regulations), the efficiency evaluation refers to:
• just the pump and not the pump and motor assembly (electric or combustion);
• pumps with a nominal pressure PN not higher than 25 bar (2500 kPa);
• pumps designed to operate at a speed of 2900 min^{-1} (for electric pumps this means 50 Hz 2-pole electric motors);
• pumps with a maximum flow of 100 m^3/h;
• use with clean water at a temperature ranging from -10°C to 120°C (the test is performed with cold water at a temperature not higher than 40°C).
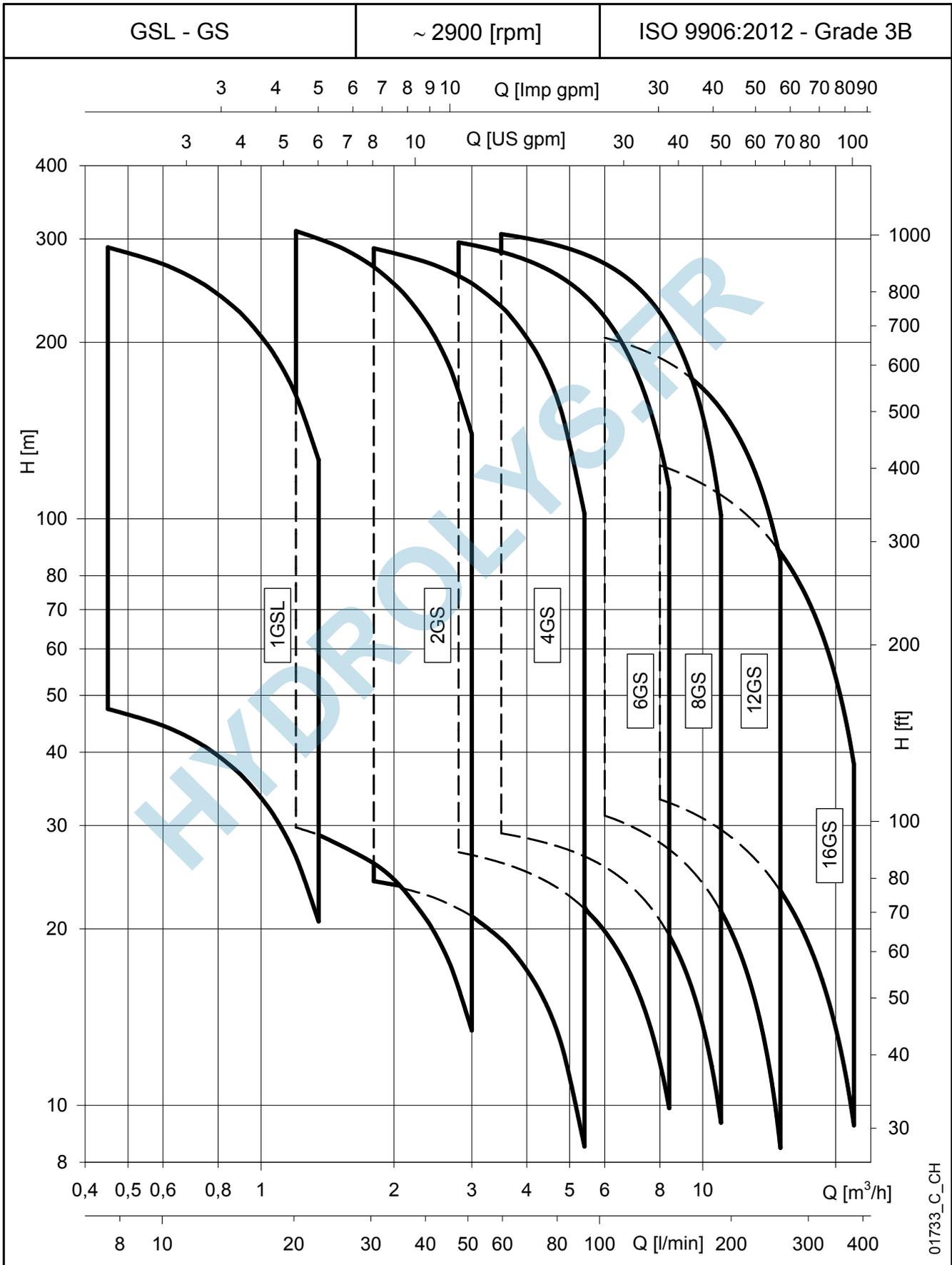
The Regulation also establishes the following deadlines:

from	minimum efficiency index (MEI)
1st January 2015	MEI ≥ 0,4

Regulation (EU) n. 547/2012 – Annex II – point 2 (Product information requirements)

1) Minimum efficiency index: see the MEI column in the tables in the "*Hydraulic performance range*" section.

2) "The benchmark for most efficient water pumps is MEI ≥ 0,70".

3) Year of manufacture: from January 2013.

4) Manufacturer: Lowara srl Unipersonale - Reg. No. 03471820260 - Montecchio Maggiore, Vicenza, Italy.

5) Product type: see the PUMP TYPE column in the tables in the "*Hydraulic performance range*" section.

6) Hydraulic pump efficiency with trimmed impeller: not applicable to these products.

7) Pump performance curves, including the performance curve: see the "*Operating Characteristics*" graphs in the following pages.

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

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

10) Information relevant for disassembly, recycling or disposal at end-of-life: observe the current laws and by-laws governing sorted waste disposal. Consult the product operating manual.

11) "Designed for use below – 10 °C only": note not applicable to these products.

12) "Designed for use above 120 °C only": note not applicable to these products.

13) Specific instructions for pumps as per points 11 and 12: not applicable to these products.

14) "Information on benchmark efficiency is available at": www.europump.org (Ecodesign section).

15) The benchmark efficiency graphs with MEI = 0.7 and MEI = 0.4 are available at www.europump.org/efficiencycharts or http://europump.net/uploads/Fingerprints.pdf (refer to "Multistage Vertical 2900 rpm").

GSL - GS	~ 2900 [rpm]	ISO 9906:2012 - Grade 3B

Q [Imp gpm]: 3 4 5 6 7 8 9 10 30 40 50 60 70 80 90

Q [US gpm]: 3 4 5 6 7 8 10 30 40 50 60 70 80 100

H [m]: 400 300 200 100 80 70 60 50 40 30 20 10 8

H [ft]: 1000 800 700 600 500 400 300 200 100 80 70 60 50 40 30

Pump curves: 1GSL, 2GS, 4GS, 6GS, 8GS, 12GS, 16GS

Q [m³/h]: 0,4 0,5 0,6 0,8 1 2 3 4 5 6 8 10

Q [l/min]: 8 10 20 30 40 50 60 80 100 200 300 400

01733_C_CH

1GSL SERIES
OPERATING CHARACTERISTICS AT 50 Hz

PUMP TYPE	N. OF STAGES	MOTOR POWER		MEI[2] ≥	Q = DELIVERY						
					l/min	0	8,3	10	15	20	22,5
					m³/h	0	0,5	0,6	0,9	1,2	1,35
		kW	HP		H = TOTAL HEAD METRES COLUMN OF WATER						
1GSL02[1]	8	0,37	0,5	0,4	53	46,6	45	37	27	20,6	
1GSL03	12	0,37	0,5	0,4	79,4	69,9	67	55	40	30,9	
1GSL05	18	0,55	0,75	0,4	119	105	100	83	60	46,3	
1GSL07	24	0,75	1	0,4	159	140	133	110	80	61,7	
1GSL11	35	1,1	1,5	0,4	232	204	194	160	116	90	
1GSL15	49	1,5	2	0,4	324	285	272	224	163	126	

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A)   1gsl-2p50-en_d_th
(1) Maximum pump absorbed power: 0,25 kW - 0,33 HP.
(2) Index of efficiency MEI.
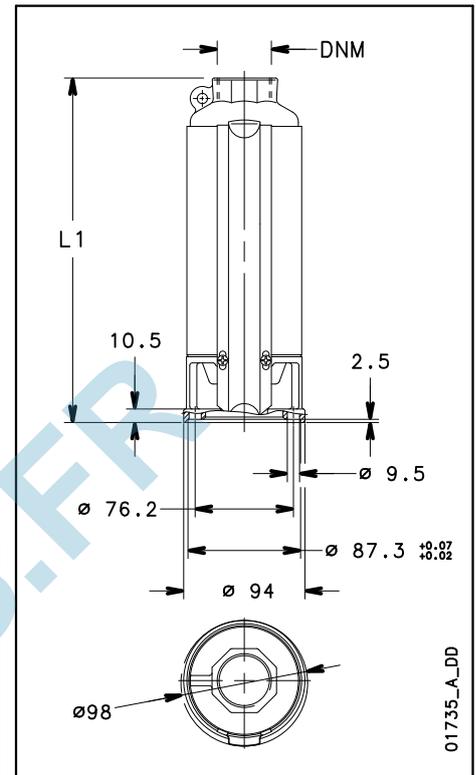
1GSL..4OS SERIES DIMENSIONS AND WEIGHTS

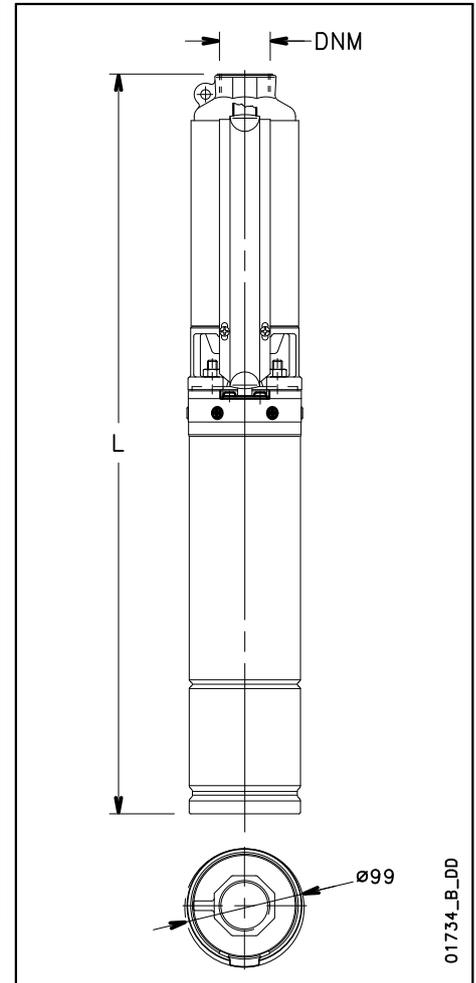| ELECTRIC PUMP TYPE*	N. OF STAGES	DNM	DIMENSIONS (mm)		PUMP WEIGHT	ELECTRIC PUMP WEIGHT
			L1	L	kg	kg
1GSL02M-4OS	8	Rp 1 ¼	298	651	3,1	10,7
1GSL03M-4OS	12	Rp 1 ¼	369	722	3,9	11,5
1GSL05M-4OS	18	Rp 1 ¼	472	825	4,9	13,1
1GSL07M-4OS	24	Rp 1 ¼	578	956	5,8	15,1
1GSL11M-4OS	35	Rp 1 ¼	824	1237	8,7	19,9
1GSL15M-4OS	49	Rp 1 ¼	1068	1516	11,8	24,6
1GSL03T-4OS	12	Rp 1 ¼	369	701	3,9	11
1GSL05T-4OS	18	Rp 1 ¼	472	825	4,9	12,5
1GSL07T-4OS	24	Rp 1 ¼	578	931	5,8	14
1GSL11T-4OS	35	Rp 1 ¼	824	1202	8,7	18
1GSL15T-4OS	49	Rp 1 ¼	1068	1481	11,8	23,2

* Pump and motor are supplied uncoupled in two separated packages if: 1gsl-4os-2p50-en_a_td
- the motor is single-phase ≥ 2,2 kW or three-phase ≥ 3 kW
- or the total length is > 1500 mm

1GSL..L4C SERIES DIMENSIONS AND WEIGHTS

ELECTRIC PUMP TYPE*	N. OF STAGES	DNM	DIMENSIONS (mm)		PUMP WEIGHT	ELECTRIC PUMP WEIGHT
			L1	L	kg	kg
1GSL02M-L4C	8	Rp 1 ¼	298	532	3,1	10,3
1GSL03M-L4C	12	Rp 1 ¼	369	603	3,9	11,2
1GSL05M-L4C	18	Rp 1 ¼	472	736	4,9	12,7
1GSL07M-L4C	24	Rp 1 ¼	578	862	5,8	14,2
1GSL11M-L4C	35	Rp 1 ¼	824	1153	8,7	19,6
1GSL15M-L4C	49	Rp 1 ¼	1068	1459	11,8	24,5
1GSL03T-L4C	12	Rp 1 ¼	369	583	3,9	10,9
1GSL05T-L4C	18	Rp 1 ¼	472	706	4,9	12,1
1GSL07T-L4C	24	Rp 1 ¼	578	842	5,8	13,6
1GSL11T-L4C	35	Rp 1 ¼	824	1108	8,7	17,1
1GSL15T-L4C	49	Rp 1 ¼	1068	1414	11,8	23,8

* Pump and motor are supplied uncoupled in two separated packages if: 1gsl-l4c-2p50-en_b_td
- the motor is single-phase ≥ 2,2 kW or three-phase ≥ 3 kW
- or the total length is > 1500 mm

1GSL	~ 2900 [rpm]	ISO 9906:2012 - Grade 3B

These performances are valid for liquids with density ρ = 1.0 Kg/dm³ and kinematic viscosity ν = 1 mm²/sec.

1GSL_2P50_A_CH

2GS SERIES
OPERATING CHARACTERISTICS AT 50 Hz

PUMP TYPE	N. OF STAGES	MOTOR POWER		MEI[2] ≥	Q = DELIVERY						
					l/min	0	20	25	30	40	50
					m³/h	0	1,2	1,5	1,8	2,4	3
		kW	HP		H = TOTAL HEAD METRES COLUMN OF WATER						
2GS02[1]	5	0,37	0,5	0,4	33		30	28	26	20	13
2GS03	7	0,37	0,5	0,4	47		42	40	36	29	19
2GS05	10	0,55	0,75	0,4	67		60	56	52	41	27
2GS07	14	0,75	1	0,4	93		83	79	73	57	37
2GS11	20	1,1	1,5	0,4	133		119	113	104	82	53
2GS15	28	1,5	2	0,4	187		167	158	146	115	74
2GS22	40	2,2	3	0,4	267		238	226	208	164	106
2GS30	52	3	4	0,4	347		309	294	271	213	138

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A)   2gs-2p50-en_d_th
(1) Maximum pump absorbed power: 0,25 kW - 0,33 HP.
(2) Index of efficiency MEI.
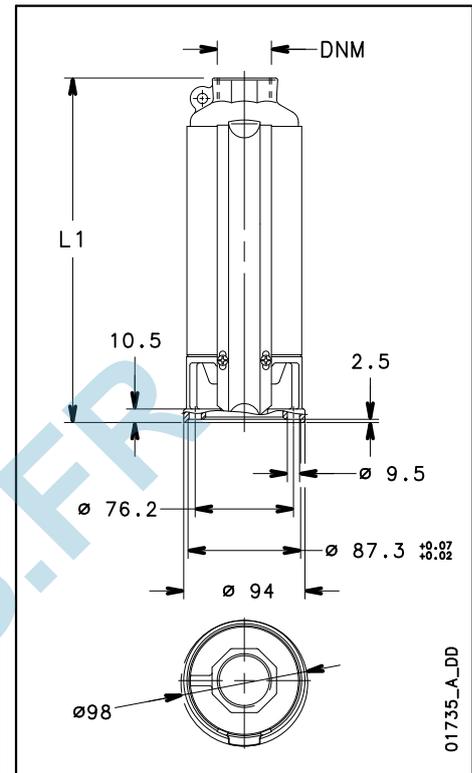
2GS..4OS SERIES DIMENSIONS AND WEIGHTS

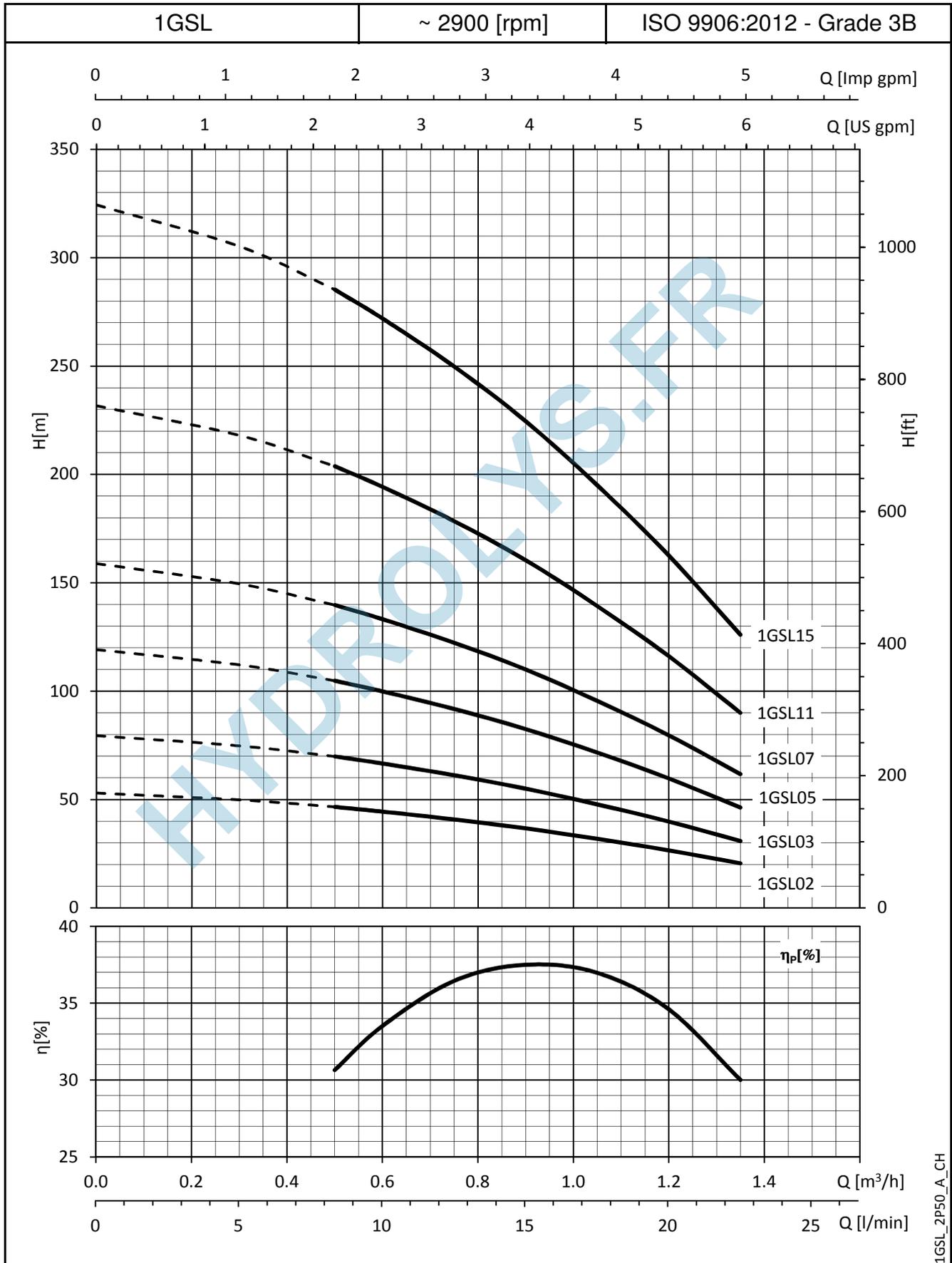| ELECTRIC PUMP TYPE *	N. OF STAGES	DNM	DIMENSIONS (mm)		PUMP WEIGHT	ELECTRIC PUMP WEIGHT
			L1	L	kg	kg
2GS02M-4OS	5	Rp 1 ¼	245	598	2,6	10,2
2GS03M-4OS	7	Rp 1 ¼	280	633	2,9	10,5
2GS05M-4OS	10	Rp 1 ¼	332	685	3,5	11,7
2GS07M-4OS	14	Rp 1 ¼	402	780	4,2	13,5
2GS11M-4OS	20	Rp 1 ¼	507	920	5,3	16,5
2GS15M-4OS	28	Rp 1 ¼	680	1128	7,1	19,9
2GS22M-4OS	40	Rp 1 ¼	914	1412	10,1	25,2
2GS03T-4OS	7	Rp 1 ¼	280	612	2,9	10
2GS05T-4OS	10	Rp 1 ¼	332	685	3,5	11,1
2GS07T-4OS	14	Rp 1 ¼	402	755	4,2	12,4
2GS11T-4OS	20	Rp 1 ¼	507	885	5,3	14,6
2GS15T-4OS	28	Rp 1 ¼	680	1093	7,1	18,5
2GS22T-4OS	40	Rp 1 ¼	914	1362	10,1	23
2GS30T-4OS	52	Rp 1 ¼	1120	1568	12,2	26,1

* Pump and motor are supplied uncoupled in two separated packages if: 2gs-4os-2p50-en_a_td
- the motor is single-phase ≥ 2,2 kW or three-phase ≥ 3 kW
- or the total length is > 1500 mm
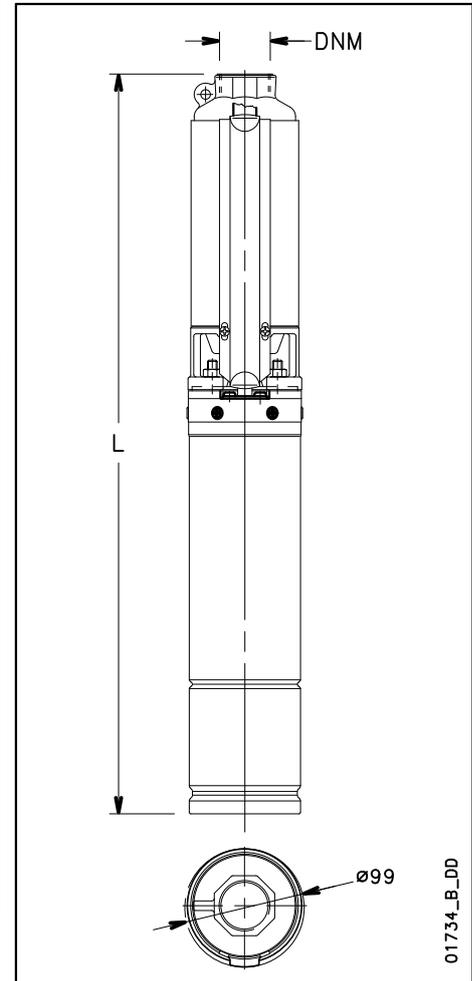
2GS..L4C SERIES DIMENSIONS AND WEIGHTS

ELECTRIC PUMP TYPE *	N. OF STAGES	DNM	DIMENSIONS (mm)		PUMP WEIGHT	ELECTRIC PUMP WEIGHT
			L1	L	kg	kg
2GS02M-L4C	5	Rp 1 ¼	245	479	2,6	9,8
2GS03M-L4C	7	Rp 1 ¼	280	514	2,9	10,1
2GS05M-L4C	10	Rp 1 ¼	332	596	3,5	11,3
2GS07M-L4C	14	Rp 1 ¼	402	686	4,2	12,6
2GS11M-L4C	20	Rp 1 ¼	507	836	5,3	16,2
2GS15M-L4C	28	Rp 1 ¼	680	1071	7,1	19,8
2GS22M-L4C	40	Rp 1 ¼	914	1325	10,1	24,3
2GS03T-L4C	7	Rp 1 ¼	280	494	2,9	9,9
2GS05T-L4C	10	Rp 1 ¼	332	566	3,5	10,7
2GS07T-L4C	14	Rp 1 ¼	402	666	4,2	12
2GS11T-L4C	20	Rp 1 ¼	507	791	5,3	13,7
2GS15T-L4C	28	Rp 1 ¼	680	1026	7,1	19,1
2GS22T-L4C	40	Rp 1 ¼	914	1305	10,1	22,9
2GS30T-L4C	52	Rp 1 ¼	1120	1662	12,2	32,8

* Pump and motor are supplied uncoupled in two separated packages if: 2gs-l4c-2p50-en_b_td
- the motor is single-phase ≥ 2,2 kW or three-phase ≥ 3 kW
- or the total length is > 1500 mm

2GS SERIES
OPERATING CHARACTERISTICS AT 50 Hz
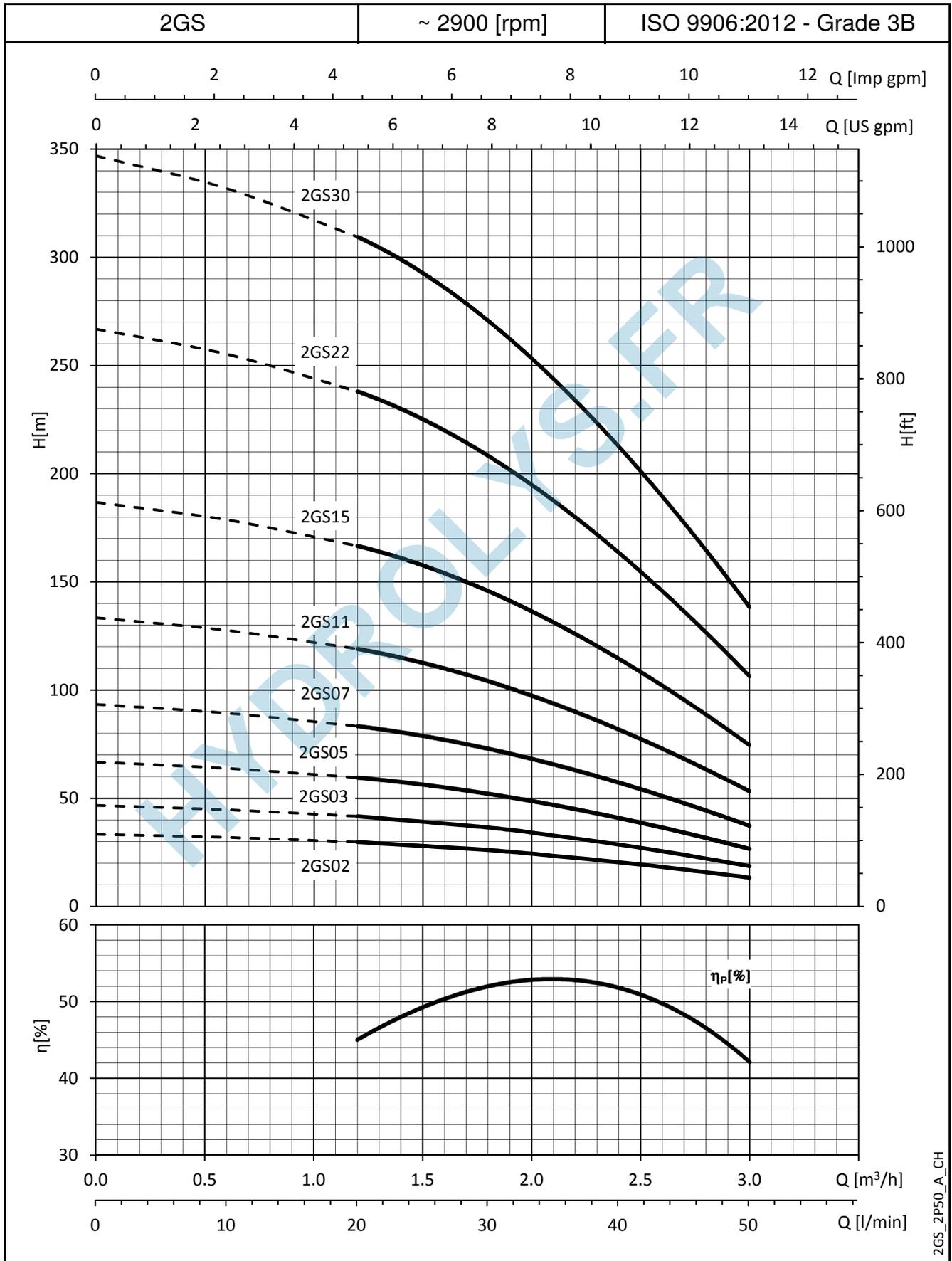
2GS	~ 2900 [rpm]	ISO 9906:2012 - Grade 3B

These performances are valid for liquids with density ρ = 1.0 Kg/dm³ and kinematic viscosity ν = 1 mm²/sec.

2GS_2P50_A_CH

4GS SERIES
OPERATING CHARACTERISTICS AT 50 Hz

PUMP TYPE	N. OF STAGES	MOTOR POWER		MEI[1] ≥	Q = DELIVERY					
					l/min	0	30	40	60	80	90
					m³/h	0	1,8	2,4	3,6	4,8	5,4
		kW	HP		H = TOTAL HEAD METRES COLUMN OF WATER						
4GS03	4	0,37	0,5	0,4	27	24	23	19	13	9
4GS05	7	0,55	0,75	0,4	47	42	40	33	22	15
4GS07	9	0,75	1	0,4	60	54	51	42	28	19
4GS11	14	1,1	1,5	0,4	94	84	80	66	44	30
4GS15	19	1,5	2	0,4	127	114	108	89	60	40
4GS22	27	2,2	3	0,4	181	162	154	127	85	57
4GS30	35	3	4	0,4	228	204	194	160	107	72
4GS40	48	4	5,5	0,4	321	288	274	226	151	102

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A)   4gs-2p50-en_b_th
(1) Index of efficienzy MEI.

4GS..4OS SERIES DIMENSIONS AND WEIGHTS

ELECTRIC PUMP TYPE *	N. OF STAGES	DNM	DIMENSIONS (mm)		PUMP WEIGHT	ELECTRIC PUMP WEIGHT
			L1	L	kg	kg
4GS03M-4OS	4	Rp 1 ¼	245	598	2,5	10,1
4GS05M-4OS	7	Rp 1 ¼	309	662	3,1	11,3
4GS07M-4OS	9	Rp 1 ¼	352	730	3,5	12,8
4GS11M-4OS	14	Rp 1 ¼	460	873	4,6	15,8
4GS15M-4OS	19	Rp 1 ¼	568	1016	5,7	18,5
4GS22M-4OS	27	Rp 1 ¼	770	1268	7,6	22,7
4GS03T-4OS	4	Rp 1 ¼	245	577	2,5	9,6
4GS05T-4OS	7	Rp 1 ¼	309	662	3,1	10,7
4GS07T-4OS	9	Rp 1 ¼	352	705	3,5	11,7
4GS11T-4OS	14	Rp 1 ¼	460	838	4,6	13,9
4GS15T-4OS	19	Rp 1 ¼	568	981	5,7	17,1
4GS22T-4OS	27	Rp 1 ¼	770	1218	7,6	20,5
4GS30T-4OS	35	Rp 1 ¼	967	1415	9,6	23,5
4GS40T-4OS	48	Rp 1 ¼	1248	1816	12,8	30,6

* Pump and motor are supplied uncoupled in two separated packages if: 4gs-4os-2p50-en_a_td
- the motor is single-phase ≥ 2,2 kW or three-phase ≥ 3 kW
- or the total length is > 1500 mm
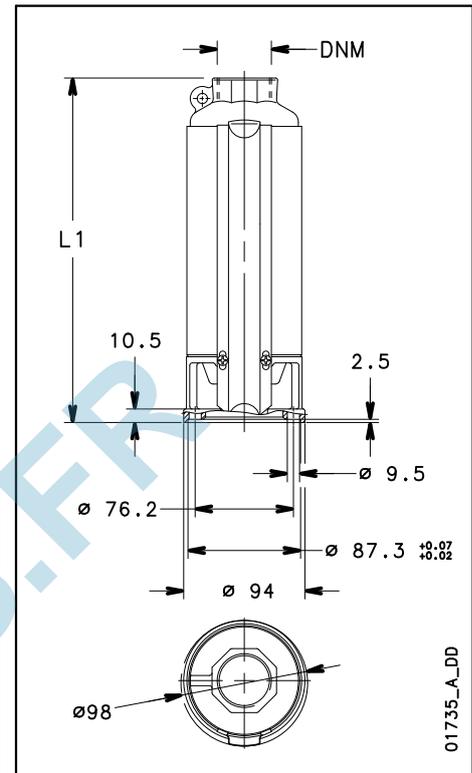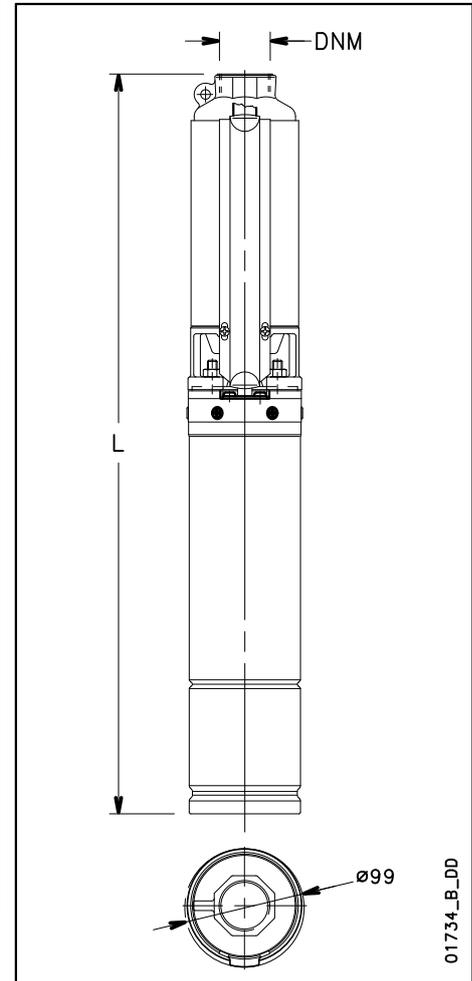

4GS..L4C SERIES DIMENSIONS AND WEIGHTS

ELECTRIC PUMP TYPE*	N. OF STAGES	DNM	DIMENSIONS (mm)		PUMP WEIGHT	ELECTRIC PUMP WEIGHT
			L1	L	kg	kg
4GS03M-L4C	4	Rp 1 ¼	245	479	2,5	9,7
4GS05M-L4C	7	Rp 1 ¼	309	573	3,1	10,9
4GS07M-L4C	9	Rp 1 ¼	352	636	3,5	11,9
4GS11M-L4C	14	Rp 1 ¼	460	789	4,6	15,5
4GS15M-L4C	19	Rp 1 ¼	568	959	5,7	18,4
4GS22M-L4C	27	Rp 1 ¼	770	1181	7,6	21,8
4GS03T-L4C	4	Rp 1 ¼	245	459	2,5	9,5
4GS05T-L4C	7	Rp 1 ¼	309	543	3,1	10,3
4GS07T-L4C	9	Rp 1 ¼	352	616	3,5	11,3
4GS11T-L4C	14	Rp 1 ¼	460	744	4,6	13
4GS15T-L4C	19	Rp 1 ¼	568	914	5,7	17,7
4GS22T-L4C	27	Rp 1 ¼	770	1161	7,6	20,4
4GS30T-L4C	35	Rp 1 ¼	967	1509	9,6	30,2
4GS40T-L4C	48	Rp 1 ¼	1248	1860	12,8	36,5

* Pump and motor are supplied uncoupled in two separated packages if: 4gs-l4c-2p50-en_b_td
- the motor is single-phase ≥ 2,2 kW or three-phase ≥ 3 kW
- or the total length is > 1500 mm

4GS SERIES
OPERATING CHARACTERISTICS AT 50 Hz

4GS	~ 2900 [rpm]	ISO 9906:2012 - Grade 3B

These performances are valid for liquids with density ρ = 1.0 Kg/dm³ and kinematic viscosity ν = 1 mm²/sec.

4GS_2P50_A_CH

6GS SERIES
OPERATING CHARACTERISTICS AT 50 Hz

PUMP TYPE	N. OF STAGES	MOTOR POWER		MEI[1] ≥	Q = DELIVERY					
					l/min 0	60	80	100	120	140
					m3/h 0	3,6	4,8	6,0	7,2	8,4
		kW	HP		H = TOTAL HEAD METRES COLUMN OF WATER					
6GS05	5	0,55	0,75	0,4	30,6	25,7	23,2	19,8	15,4	9,9
6GS07	7	0,75	1	0,4	42,8	36,0	32,5	27,7	21,5	13,8
6GS11	10	1,1	1,5	0,4	61,9	51,8	47,0	40,3	31,5	20,7
6GS15	14	1,5	2	0,4	86,7	72,6	65,7	56,4	44,1	29,0
6GS22	21	2,2	3	0,4	132,0	112,5	102,3	87,7	68,4	44,8
6GS30	29	3	4	0,4	182,5	155,6	141,5	121,3	94,6	62,0
6GS40R	33	4	5,5	0,4	211,0	179,9	163,6	140,3	109,4	71,7
6GS40	38	4	5,5	0,4	243,0	207,2	188,4	161,5	126,0	82,5
6GS55R	44	5,5	7,5	0,4	281,4	239,9	218,1	187,0	145,9	95,6
6GS55	52	5,5	7,5	0,4	332,6	283,6	257,8	221,0	172,4	112,9

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A)   6gs-2p50-en_e_th
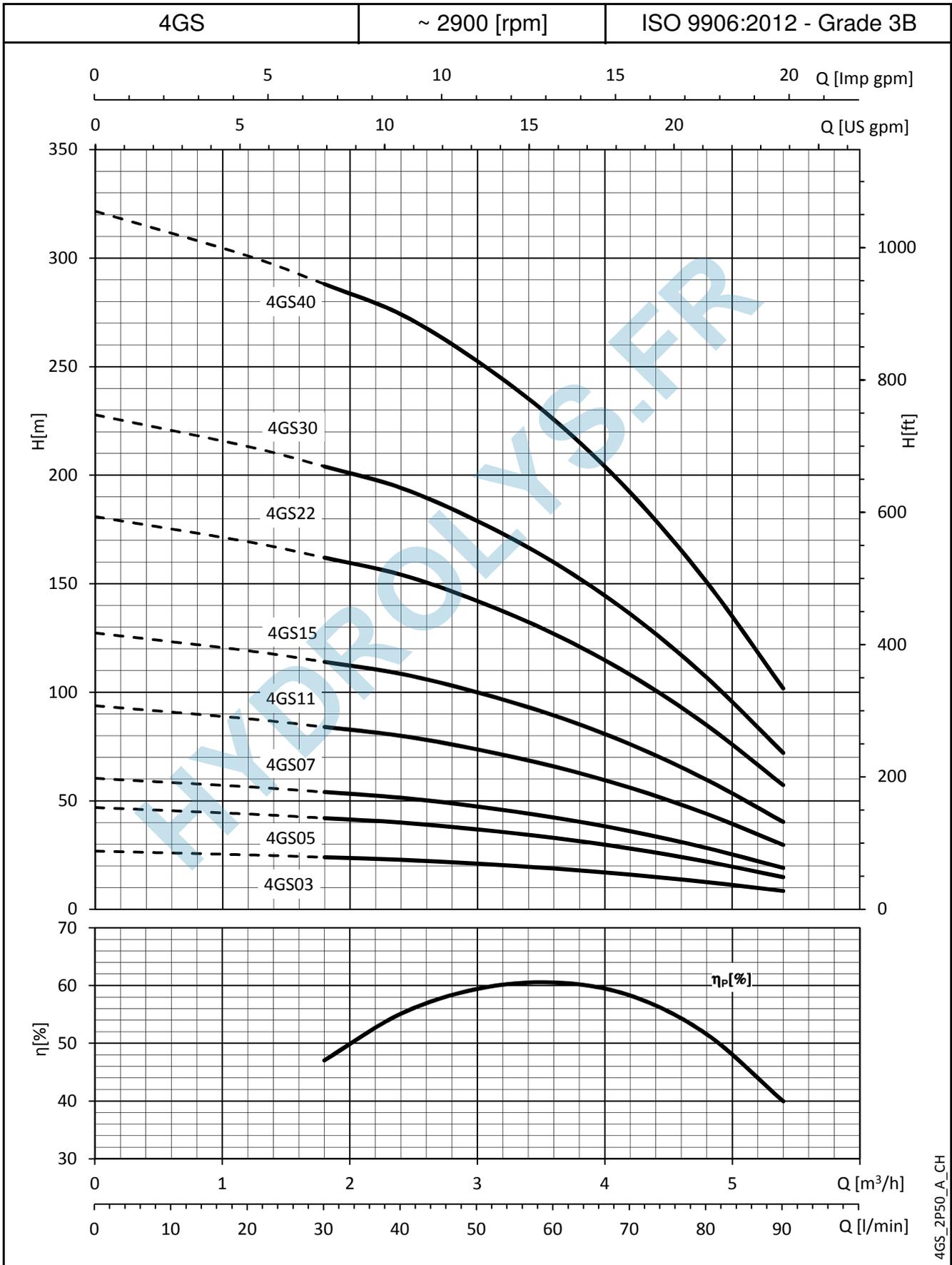(1) Index of efficiency MEI.
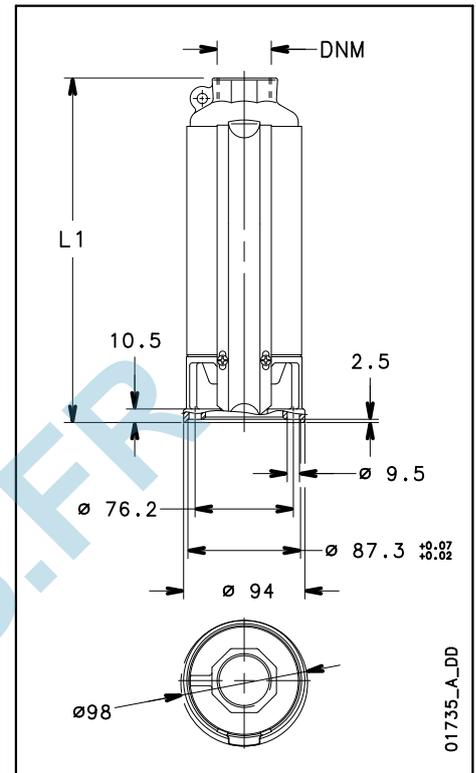
6GS..4OS SERIES DIMENSIONS AND WEIGHTS

ELECTRIC PUMP TYPE*	N. OF STAGES	DNM	DIMENSIONS (mm)		PUMP WEIGHT	ELECTRIC PUMP WEIGHT
			L1	L	kg	kg
6GS05M-4OS	5	Rp 1 ¼	329	682	3,5	11,7
6GS07M-4OS	7	Rp 1 ¼	390	768	4,2	13,5
6GS11M-4OS	10	Rp 1 ¼	485	898	5,1	16,3
6GS15M-4OS	14	Rp 1 ¼	645	1093	6,8	19,6
6GS22M-4OS	21	Rp 1 ¼	862	1360	9,1	24,2
6GS05T-4OS	5	Rp 1 ¼	329	682	3,5	11,1
6GS07T-4OS	7	Rp 1 ¼	390	743	4,2	12,4
6GS11T-4OS	10	Rp 1 ¼	485	863	5,1	14,4
6GS15T-4OS	14	Rp 1 ¼	645	1058	6,8	18,2
6GS22T-4OS	21	Rp 1 ¼	862	1310	9,1	22
6GS30T-4OS	29	Rp 1 ¼	1127	1575	11,8	25,7
6GS40RT-4OS	33	Rp 1 ¼	1252	1822	13,2	30,5
6GS40T-4OS	38	Rp 1 ¼	1406	1974	14,7	32,5
6GS55RT-4OS	44	Rp 1 ¼	1593	2223	16,6	37,4
6GS55T-4OS	52	Rp 1 ¼	1840	2468	19,3	40,6

* Pump and motor are supplied uncoupled   6gs-4os-2p50-en_b_td
- the motor is single-phase ≥ 2,2 kW or three-phase ≥ 3 kW
- or the total length is > 1500 mm

6GS..L4C SERIES DIMENSIONS AND WEIGHTS

ELECTRIC PUMP TYPE*	N. OF STAGES	DNM	DIMENSIONS (mm)		PUMP WEIGHT	ELECTRIC PUMP WEIGHT
			L1	L	kg	kg
6GS05M-L4C	5	Rp 1 ¼	329	593	3,5	11,3
6GS07M-L4C	7	Rp 1 ¼	390	674	4,2	12,6
6GS11M-L4C	10	Rp 1 ¼	485	814	5,1	16
6GS15M-L4C	14	Rp 1 ¼	645	1036	6,8	19,5
6GS22M-L4C	21	Rp 1 ¼	862	1273	9,1	23,3
6GS05T-L4C	5	Rp 1 ¼	329	563	3,5	10,7
6GS07T-L4C	7	Rp 1 ¼	390	654	4,2	12
6GS11T-L4C	10	Rp 1 ¼	485	769	5,1	13,5
6GS15T-L4C	14	Rp 1 ¼	645	991	6,8	18,8
6GS22T-L4C	21	Rp 1 ¼	862	1253	9,1	21,9
6GS30T-L4C	29	Rp 1 ¼	1127	1669	11,8	32,4
6GS40RT-L4C	33	Rp 1 ¼	1252	1822	13,2	36,7
6GS40T-L4C	38	Rp 1 ¼	1406	1974	14,7	38,4
6GS55RT-L4C	44	Rp 1 ¼	1593	2223	16,6	43,4
6GS55T-L4C	52	Rp 1 ¼	1840	2522	19,3	46,3

* Pump and motor are supplied uncoupled in two separated packages if: 6gs-l4c-2p50-en_c_td
- the motor is single-phase ≥ 2,2 kW or three-phase ≥ 3 kW
- or the total length is > 1500 mm

6GS SERIES
OPERATING CHARACTERISTICS AT 50 Hz

6GS	~ 2900 [rpm]	ISO 9906:2012 - Grade 3B

These performances are valid for liquids with density ρ = 1.0 Kg/dm³ and kinematic viscosity ν = 1 mm²/sec.

6GS_2P50_A_CH

8GS SERIES
OPERATING CHARACTERISTICS AT 50 Hz

PUMP TYPE	N. OF STAGES	MOTOR POWER		MEI[1] ≥	Q = DELIVERY					
					l/min 0	90	120	140	160	183
					m3/h 0	5,4	7,2	8,4	9,6	11,0
		kW	HP		H = TOTAL HEAD METRES COLUMN OF WATER					
8GS07	5	0,75	1	0,4	32,9	26,6	22,9	19,5	15,3	9,3
8GS11	7	1,1	1,5	0,4	46,0	37,2	32,0	27,3	21,4	13,1
8GS15	10	1,5	2	0,4	65,8	53,1	45,7	39,0	30,6	18,7
8GS22	15	2,2	3	0,4	99,0	81,2	70,2	60,0	47,4	30,1
8GS30	21	3	4	0,4	138,0	113,2	97,8	83,6	66,1	42,0
8GS40	28	4	5,5	0,4	188,9	154,9	133,9	114,4	90,5	57,5
8GS55R	33	5,5	7,5	0,4	224,3	186,6	162,8	140,0	110,5	67,0
8GS55	38	5,5	7,5	0,4	258,3	214,8	187,5	161,2	127,3	77,2
8GS75R	44	7,5	10	0,4	299,1	248,7	217,1	186,6	147,4	89,4
8GS75	50	7,5	10	0,4	339,9	282,7	246,7	212,1	167,5	101,6

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A)   8gs-2p50-en_f_th
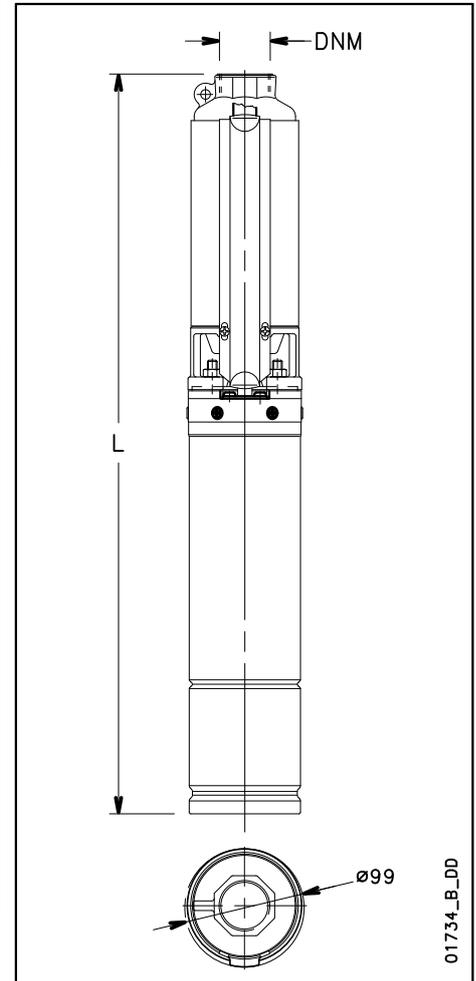(1) Index of efficiency MEI.

8GS..4OS SERIES DIMENSIONS AND WEIGHTS

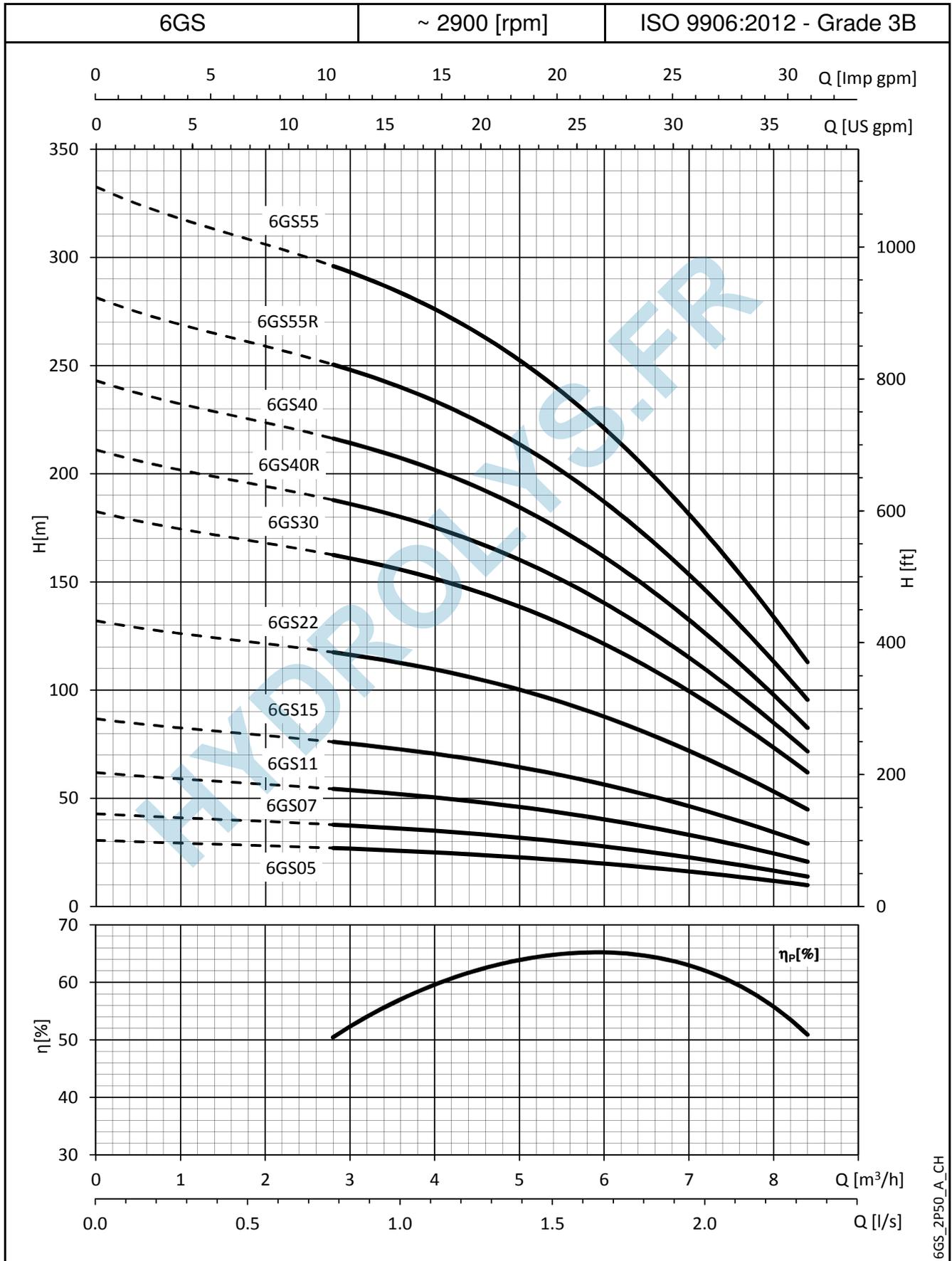| ELECTRIC PUMP TYPE*	N. OF STAGES	DNM	DIMENSIONS (mm)		PUMP WEIGHT	ELECTRIC PUMP WEIGHT
			L1	L	kg	kg
8GS07M-4OS	5	Rp 2	330	710	3,3	12,1
8GS11M-4OS	7	Rp 2	392	807	3,9	14,6
8GS15M-4OS	10	Rp 2	485	935	4,8	17,1
8GS22M-4OS	15	Rp 2	678	1178	6,4	21
8GS07T-4OS	5	Rp 2	330	685	3,3	11
8GS11T-4OS	7	Rp 2	392	772	3,9	12,7
8GS15T-4OS	10	Rp 2	485	900	4,8	15,7
8GS22T-4OS	15	Rp 2	678	1128	6,4	18,8
8GS30T-4OS	21	Rp 2	864	1314	8,2	21,6
8GS40T-4OS	28	Rp 2	1099	1669	11	28,3
8GS55RT-4OS	33	Rp 2	1254	1884	12,4	33,2
8GS55T-4OS	38	Rp 2	1409	2039	13,9	34,7
8GS75RT-4OS	44	Rp 2	1595	2431	15,6	43,9
8GS75T-4OS	50	Rp 2	1781	2617	17,3	45,6

* Pump and motor are supplied uncoupled in two separated packages if: 8gs-4os-2p50-en_c_td
- the motor is single-phase ≥ 2,2 kW or three-phase ≥ 3 kW
- or the total length is > 1500 mm
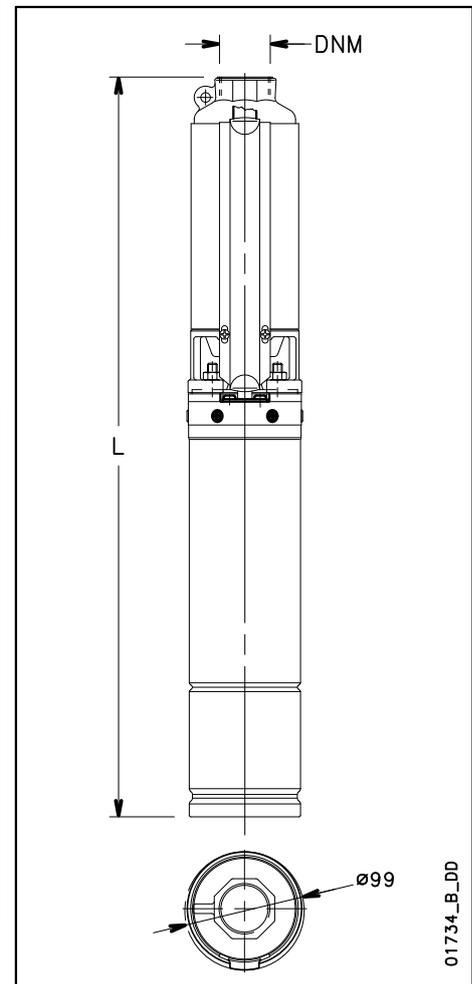
8GS..L4C SERIES DIMENSIONS AND WEIGHTS

ELECTRIC PUMP TYPE*	N. OF STAGES	DNM	DIMENSIONS (mm)		PUMP WEIGHT	ELECTRIC PUMP WEIGHT
			L1	L	kg	kg
8GS07M-L4C	5	Rp 2	330	616	3,3	11,5
8GS11M-L4C	7	Rp 2	392	723	3,9	14,6
8GS15M-L4C	10	Rp 2	485	787	4,8	17,3
8GS22M-L4C	15	Rp 2	678	1091	6,4	20,4
8GS07T-L4C	5	Rp 2	330	596	3,3	10,9
8GS11T-L4C	7	Rp 2	392	678	3,9	12,1
8GS15T-L4C	10	Rp 2	485	833	4,8	16,6
8GS22T-L4C	15	Rp 2	678	1071	6,4	19
8GS30T-L4C	21	Rp 2	864	1408	8,2	28,6
8GS40T-L4C	28	Rp 2	1099	1713	11,0	34,5
8GS55RT-L4C	33	Rp 2	1254	1938	12,4	39,2
8GS55T-L4C	38	Rp 2	1409	2093	13,9	40,7
8GS75RT-L4C	44	Rp2	1595	2359	15,6	44,6
8GS75T-L4C	50	Rp 2	1781	2545	17,3	46,3

* Pump and motor are supplied uncoupled in two separated packages if: 8gs-l4c-2p50-en_c_td
- the motor is single-phase ≥ 2,2 kW or three-phase ≥ 3 kW
- or the total length is > 1500 mm
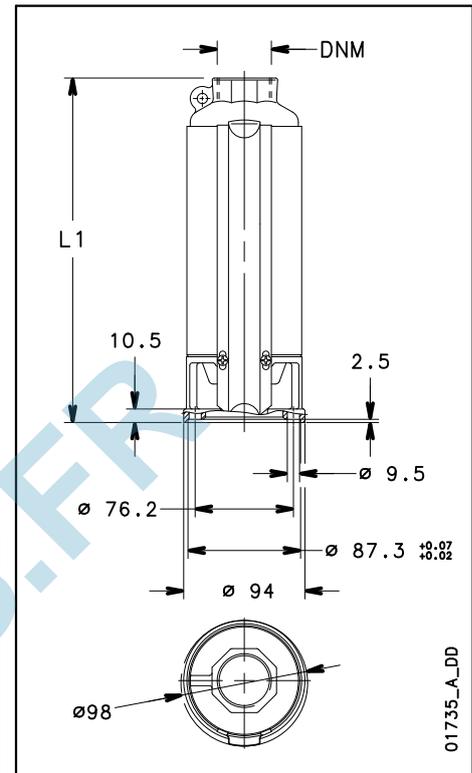
8GS SERIES
OPERATING CHARACTERISTICS AT 50 Hz

8GS	~ 2900 [rpm]	ISO 9906:2012 - Grade 3B

These performances are valid for liquids with density ρ = 1.0 Kg/dm³ and kinematic viscosity ν = 1 mm²/sec.

8GS_2P50_B_CH

12GS SERIES
OPERATING CHARACTERISTICS AT 50 Hz

PUMP TYPE	N. OF STAGES	MOTOR POWER		MEI[1] ≥	Q = DELIVERY					
					l/min 0	150	175	200	225	250
					m3/h 0	9,0	10,5	12,0	13,5	15,0
		kW	HP		H = TOTAL HEAD METRES COLUMN OF WATER					
12GS11	7	1,1	1,5	0,4	36,6	26,1	22,7	18,6	13,9	8,5
12GS15	10	1,5	2	0,4	52,3	37,3	32,4	26,6	19,8	12,1
12GS22	14	2,2	3	0,4	73,9	56,2	50,1	42,8	34,5	25,2
12GS30	19	3	4	0,4	100,4	76,8	69,0	59,5	48,3	35,6
12GS40	25	4	5,5	0,4	132,5	100,9	90,1	77,1	62,1	45,5
12GS55R	30	5,5	7,5	0,4	161,7	124,4	112,0	97,0	79,4	59,3
12GS55	35	5,5	7,5	0,4	188,7	145,2	130,7	113,2	92,7	69,2
12GS75	43	7,5	10	0,4	231,8	178,4	160,6	139,1	113,8	85,1

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A)   12gs-2p50-en_e_th

(1) Index of efficiency MEI.

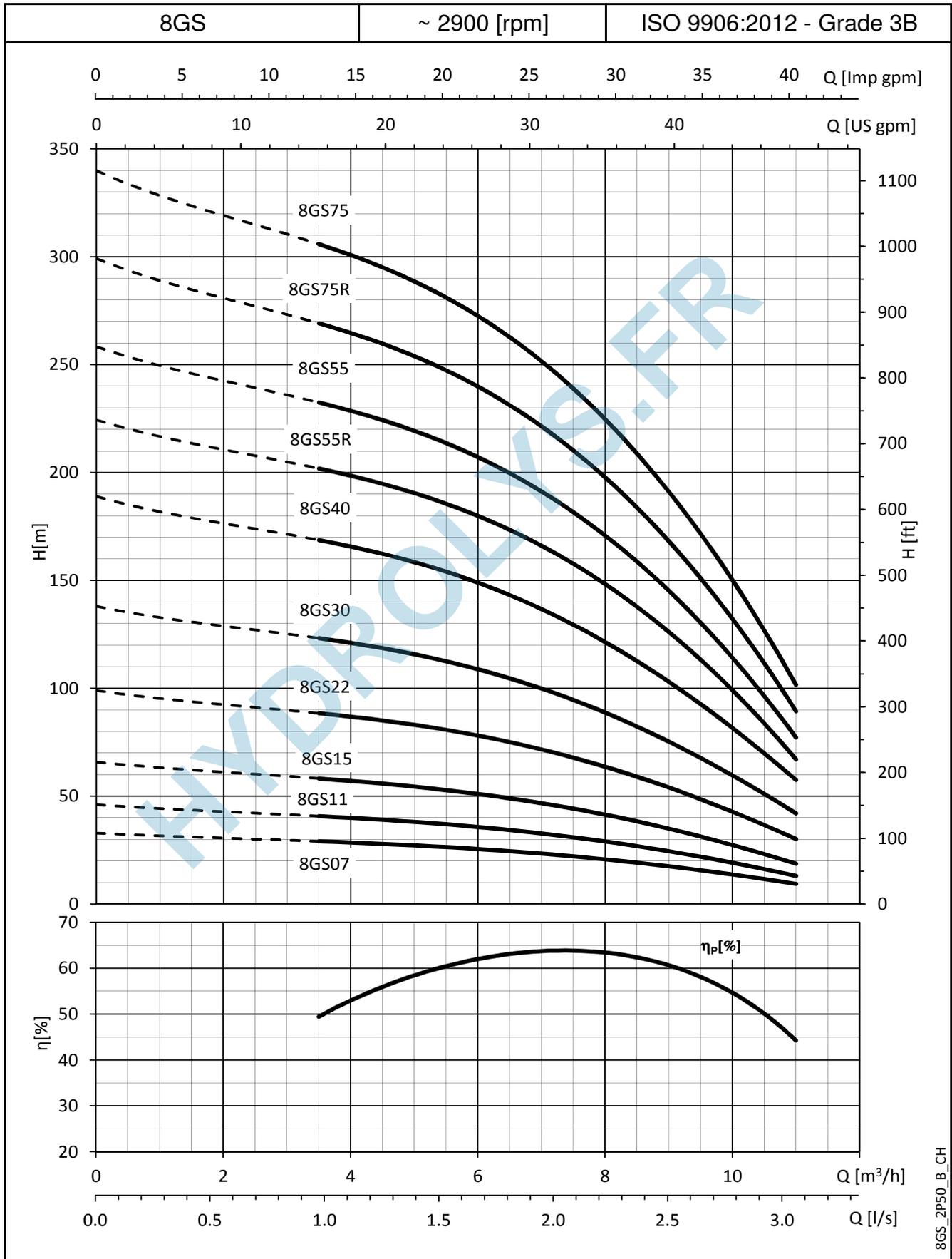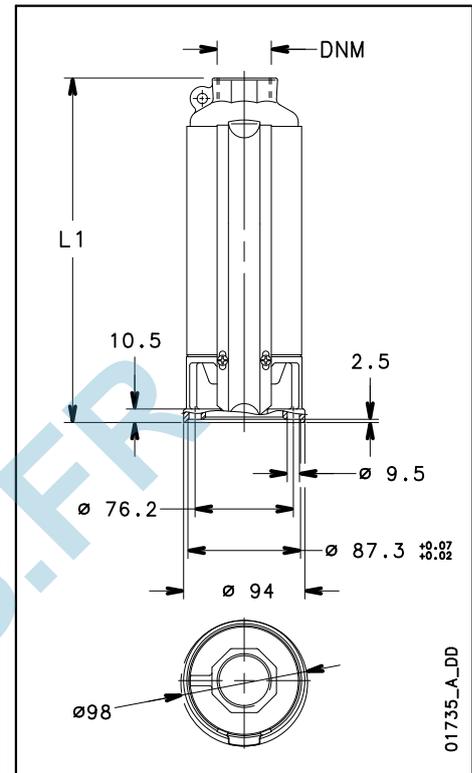## 12GS..4OS SERIES DIMENSIONS AND WEIGHTS

ELECTRIC PUMP TYPE*	N. OF STAGES	DNM	DIMENSIONS (mm)		PUMP WEIGHT	ELECTRIC PUMP WEIGHT
			L1	L	kg	kg
12GS11M/B-4OS	7	Rp 2	539	954	5,3	16,0
12GS15M/B-4OS	10	Rp 2	695	1145	6,7	19,0
12GS22M/B-4OS	14	Rp 2	940	1440	8,9	23,5
12GS11T/B-4OS	7	Rp 2	539	919	5,3	14,1
12GS15T/B-4OS	10	Rp 2	695	1110	6,7	17,6
12GS22T/B-4OS	14	Rp 2	940	1390	8,9	21,3
12GS30T/B-4OS	19	Rp 2	1200	1650	11,3	24,7
12GS40T/B-4OS	25	Rp 2	1529	2099	15,0	32,3
12GS55RT/B-4OS	30	Rp 2	1789	2419	17,4	38,2
12GS55T/B-4OS	35	Rp 2	2049	2679	19,8	40,6
12GS75T/B-4OS	43	Rp 2	2464	3300	23,7	52,0

* Pump and motor are supplied uncoupled in two separated packages if: 12gs-4os-2p50-en_c_td

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

- or the total length is > 1500 mm

12GS..L4C SERIES DIMENSIONS AND WEIGHTS

ELECTRIC PUMP TYPE*	N. OF STAGES	DNM	DIMENSIONS (mm)		PUMP WEIGHT	ELECTRIC PUMP WEIGHT
			L1	L	kg	kg
12GS11M/B-L4C	7	Rp 2	539	870	5,3	16,0
12GS15M/B-L4C	10	Rp 2	695	1088	6,7	19,2
12GS22M/B-L4C	14	Rp 2	940	1353	8,9	22,9
12GS11T/B-L4C	7	Rp 2	539	825	5,3	13,5
12GS15T/B-L4C	10	Rp 2	695	1043	6,7	18,5
12GS22T/B-L4C	14	Rp 2	940	1333	8,9	21,5
12GS30T/B-L4C	19	Rp 2	1200	1744	11,3	31,7
12GS40T/B-L4C	25	Rp 2	1529	2143	15,0	38,5
12GS55RT/B-L4C	30	Rp 2	1789	2473	17,4	44,2
12GS55T/B-L4C	35	Rp 2	2049	2733	19,8	46,6
12GS75T/B-L4C	43	Rp 2	2464	3228	23,7	52,7

* Pump and motor are supplied uncoupled in two separated packages if: 12gs-L4c-2p50-en_c_td

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

- or the total length is > 1500 mm

12GS SERIES
OPERATING CHARACTERISTICS AT 50 Hz

12GS	~ 2900 [rpm]	ISO 9906:2012 - Grade 3B

These performances are valid for liquids with density ρ = 1.0 Kg/dm³ and kinematic viscosity ν = 1 mm²/sec.

12GS_2P50_B_CH

16GS SERIES
OPERATING CHARACTERISTICS AT 50 Hz

PUMP TYPE	N. OF STAGES	MOTOR POWER		MEI[1] ≥	Q = DELIVERY					
					l/min 0	170	205	260	310	367
					m3/h 0	10,2	12,3	15,6	18,6	22,0
		kW	HP		H = TOTAL HEAD METRES COLUMN OF WATER					
16GS15	8	1,5	2	0,4	38,0	30,6	27,6	22,1	16,4	9,2
16GS22	12	2,2	3	0,4	56,9	45,9	41,4	33,2	24,6	13,9
16GS30	16	3	4	0,4	75,6	60,6	54,9	44,7	34,0	20,3
16GS40	21	4	5,5	0,4	98,0	76,7	69,3	56,4	43,2	25,3
16GS55R	25	5,5	7,5	0,4	120,0	96,1	87,1	70,9	54,0	32,2
16GS55	29	5,5	7,5	0,4	142,0	113,7	103,1	83,9	63,9	38,1

Hydraulic performances in compliance with ISO 9906:2012 - Grade 3B (ex ISO 9906:1999 - Annex A)   16gs-2p50-en_e_th
(1) Index of efficency MEI.
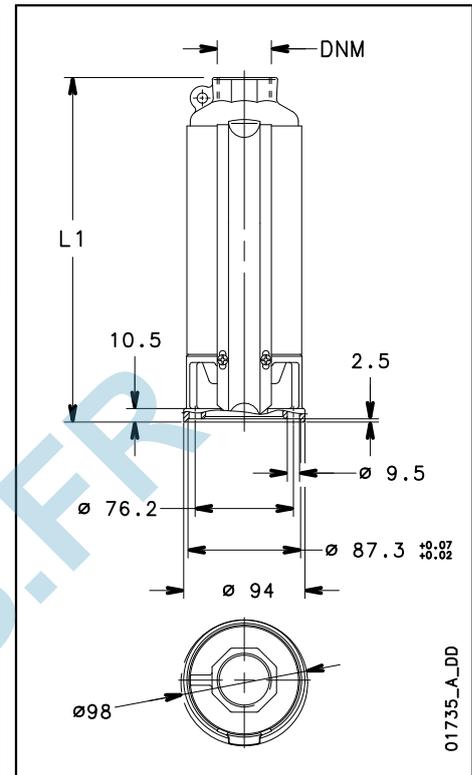
16GS..4OS SERIES DIMENSIONS AND WEIGHTS

ELECTRIC PUMP TYPE*	N. OF STAGES	DNM	DIMENSIONS (mm)		PUMP WEIGHT	ELECTRIC PUMP WEIGHT
			L1	L	kg	kg
16GS15M-4OS	8	Rp 2	681	1131	6,2	18,5
16GS22M-4OS	12	Rp 2	953	1453	8,5	23,1
16GS15T-4OS	8	Rp 2	681	1096	6,2	17,1
16GS22T-4OS	12	Rp 2	953	1403	8,5	20,9
16GS30T-4OS	16	Rp 2	1224	1674	10,8	24,2
16GS40T-4OS	21	Rp 2	1619	2189	14,7	32,0
16GS55RT-4OS	25	Rp 2	1891	2521	16,9	37,7
16GS55T-4OS	29	Rp 2	2163	2793	19,2	40,0

* Pump and motor are supplied uncoupled in two separated packages if: 16gs-4os-2p50-en_c_td

- the motor is single-phase ≥ 2,2 kW or three-phase ≥ 3 kW
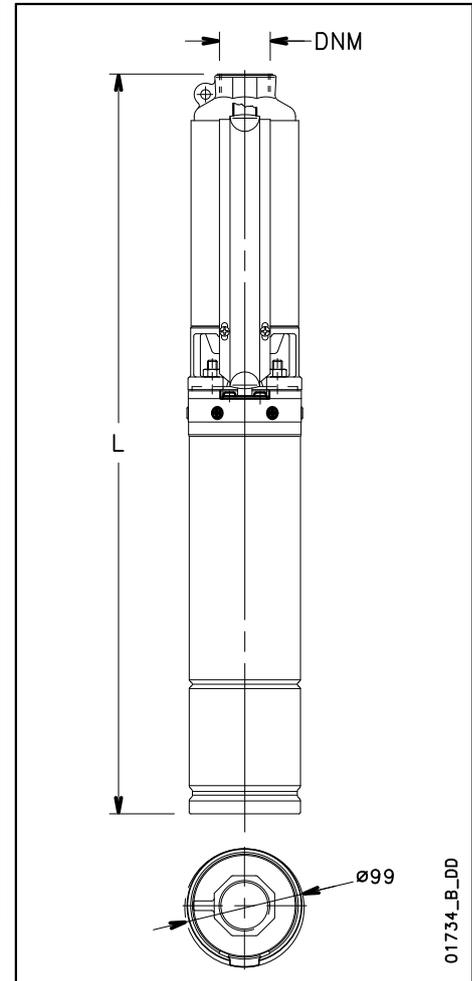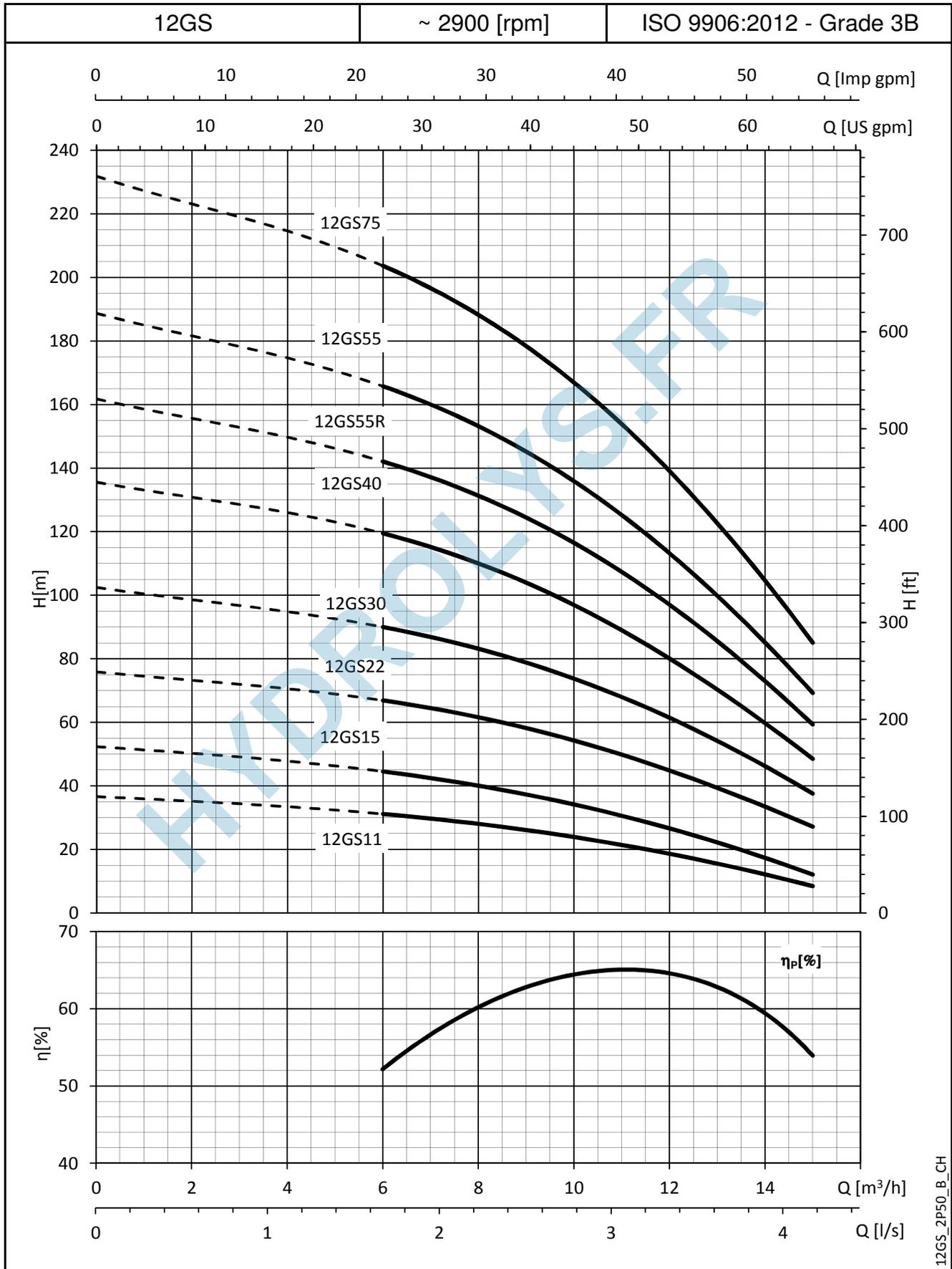
- or the total length is > 1500 mm
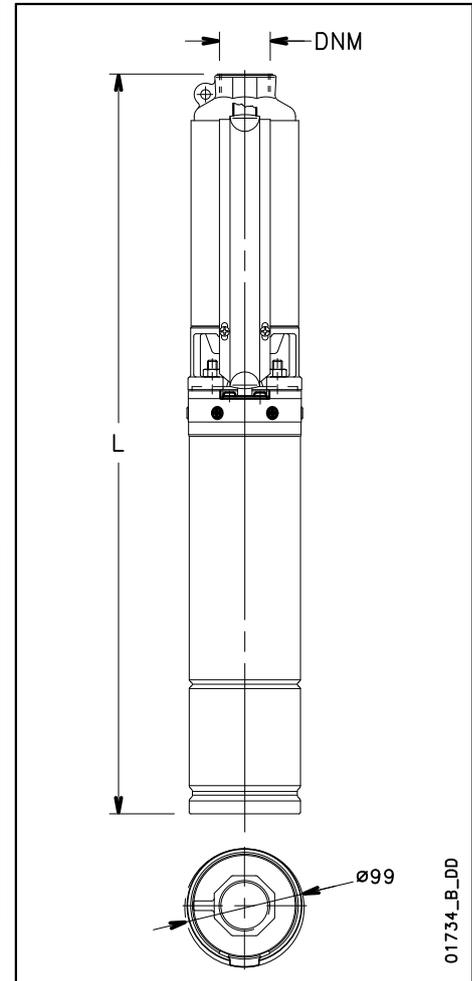
16GS..L4C SERIES DIMENSIONS AND WEIGHTS

ELECTRIC PUMP TYPE*	N. OF STAGES	DNM	DIMENSIONS (mm)		PUMP WEIGHT	ELECTRIC PUMP WEIGHT
			L1	L	kg	kg
16GS15M-L4C	8	Rp 2	681	1074	6,2	18,7
16GS22M-L4C	12	Rp 2	953	1366	8,5	22,5
16GS15T-L4C	8	Rp 2	681	1029	6,2	18,0
16GS22T-L4C	12	Rp 2	953	1346	8,5	21,1
16GS30T-L4C	16	Rp 2	1224	1768	10,8	31,2
16GS40T-L4C	21	Rp 2	1619	2233	14,7	38,2
16GS55RT-L4C	25	Rp 2	1891	2575	16,9	43,7
16GS55T-L4C	29	Rp 2	2163	2847	19,2	46,0

* Pump and motor are supplied uncoupled in two separated packages if: 16gs-l4c-2p50-en_c_td
- the motor is single-phase ≥ 2,2 kW or three-phase ≥ 3 kW
- or the total length is > 1500 mm

LOWARA
a xylem brand

16GS	~ 2900 [rpm]	ISO 9906:2012 - Grade 3B

16GS55
16GS55R
16GS40
16GS30
16GS22
16GS15

η_P[%]

These performances are valid for liquids with density ρ = 1.0 Kg/dm³ and kinematic viscosity ν = 1 mm²/sec.

16GS_2P50_A_CH
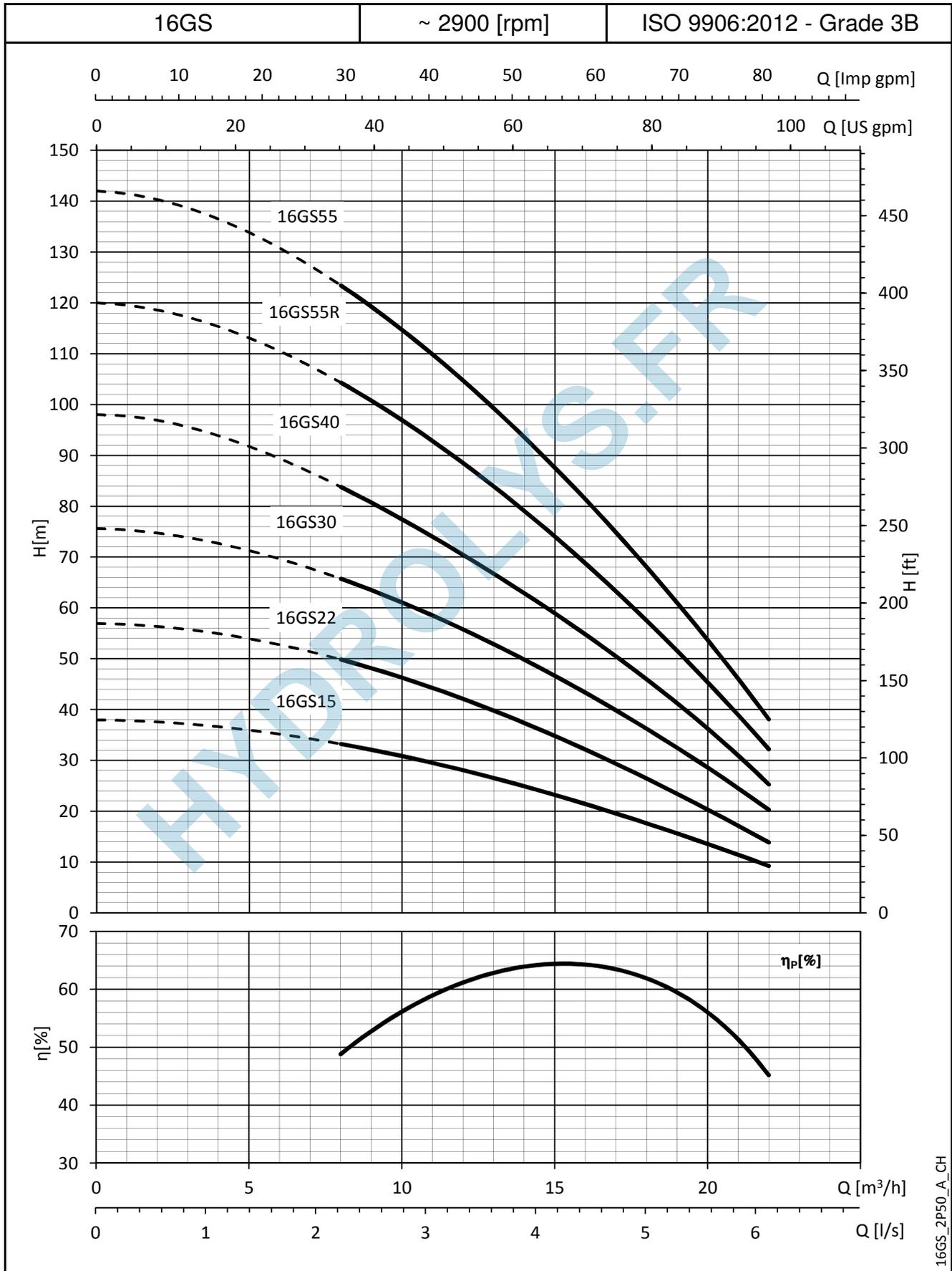
4OS - L4C SERIES MOTORS
MOTOR - CONTROL PANEL COMBINATION TABLE

MOTOR TYPE 4OS - 4" SINGLE-PHASE		RATED POWER	RATED CURRENT 220-240 V	CAPACITOR	PANEL TYPE				
kW	HP	A	µF / 450 V	QSM…	QPC…	QPCS…	QSC…	QSCS…
0,37	0,5	3,2	16	…03	…03	…03	…03	…03
0,55	0,75	4,3	20	…05	…05	…05	…05	…05
0,75	1	5,6	30	…07	…07	…07	…07	…07
1,1	1,5	7,6	40	…11	…11	…11	…11	…11
1,5	2	10,5	50	-	…15	…15	…15	…15
2,2	3	14,4	70	-	…22	…22	…22	…22
4	5,5	24,9	90	-	-	-	…40	…40

4OS-2p50-en_e_tc

MOTOR TYPE 4OS - 4" THREE-PHASE		RATED POWER	RATED CURRENTE 380-415 V		PANEL TYPE				
kW	HP	A		QTD/…	Q3D/…	Q3I/…	Q3A/…	Q3SF/…
0,37	0,5	1,2		…03-05	…03-05	-	-	-
0,55	0,75	1,7		…05-07	…05-07	-	-	-
0,75	1	2,4		…05-07	…05-07	-	-	-
1,1	1,5	3,1		…07-15	…07-15	-	-	-
1,5	2	4,4		…15-22	…15-22	-	-	-
2,2	3	6,1		…15-22	…15-22	-	-	-
3	4	7,1		…22-40	…22-40	-	-	-
4	5,5	9,8		…22-40	…22-40	-	-	-
5,5	7,5	13,7		…40-75	…40-75	…40-75	…40-75	…75
7,5	10	18,7		…75-92	…75-92	…75-92	…75-92	…150

For different voltages, please contact our sales network. 4OS-2p50-en_e_tc

MOTOR TYPE L4C - 4" SINGLE-PHASE		RATED POWER	RATED CURRENT 220-240 V	CAPACITOR	PANEL TYPE				
kW	HP	A	µF / 450 V	QSM…	QPC…	QPCS…	QSC…	QSCS…
0,37	0,5	3,4	16	…03	…03	…03	…03	…03
0,55	0,75	4,8	20	…05	…05	…05	…05	…05
0,75	1	6,5	30	…07	…07	…07	…07	…07
1,1	1,5	8,3	40	…11	…11	…11	…11	…11
1,5	2	10,7	50	-	…15	…15	…15	…15
2,2	3	15,3	70	-	…22	…22	…22	…22
4	5,5	29,9	90	-	-	-	…40	…40

L4c-2p50_i_tc

MOTOR TYPE L4C - 4" THREE-PHASE		RATED POWER	RATED CURRENT 380-415 V		PANEL TYPE				
kW	HP	A		QTD/…	Q3D/…	Q3I/…	Q3A/…	Q3SF/…
0,37	0,5	1,8		…05-07	…05-07	-	-	-
0,55	0,75	2		…05-07	…05-07	-	-	-
0,75	1	2,6		…07-15	…07-15	-	-	-
1,1	1,5	3,6		…07-15	…07-15	-	-	-
1,5	2	4,6		…15-22	…15-22	-	-	-
2,2	3	6,2		…15-22	…15-22	-	-	-
3	4	8,8		…22-40	…22-40	-	-	-
4	5,5	10,5		…40-75	…40-75	-	-	-
5,5	7,5	14,5		…40-75	…40-75	…40-75	…40-75	…75
7,5	10	18,1		…75-92	…75-92	…75-92	…75-92	…150

For different voltages please contact our sales network L4c-2p50_i_tc

COOLING SLEEVE

01890_B_DD
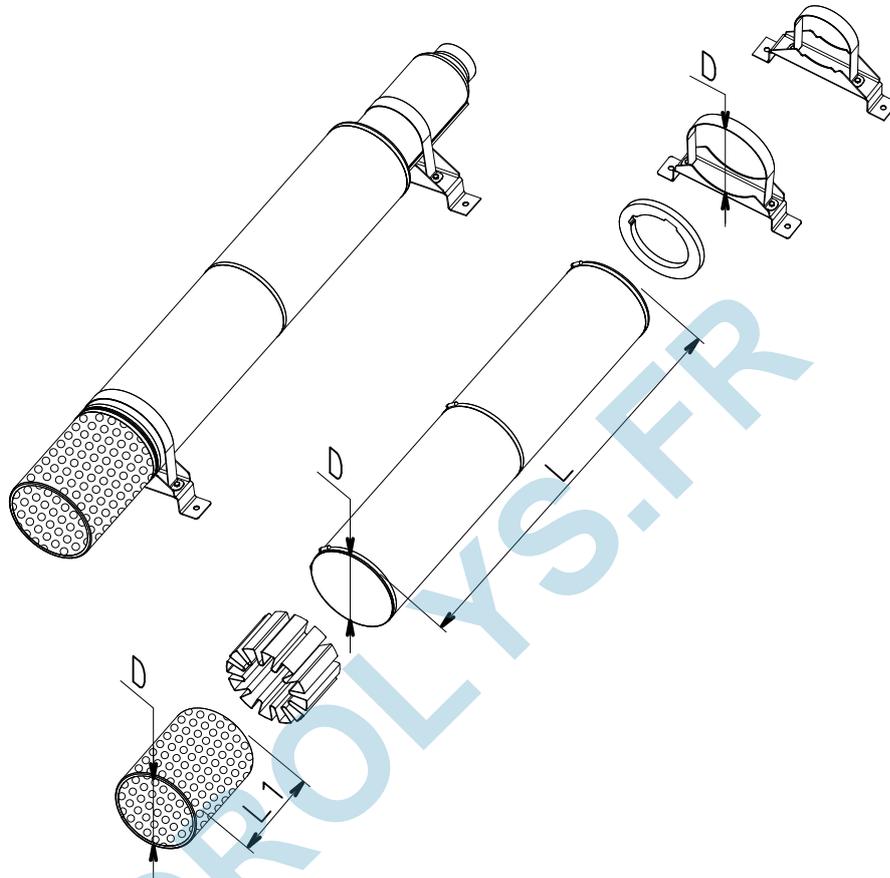
PUMP TYPE	MOTOR TYPE		COOLING SET SHROUD (D x L)	COOLING SET FILTER (D x L1)	COOLING SET BRACKETS (D)
	4OS	L4C			
1GSL 2GS 4GS 6GS 8GS 12GS	0,37	0,37	D115 x 500	D115 x 117	D115 - 2PZ
	0,55	0,55			
	0,75	0,75			
	1,1	1,1			
	1,5	1,5	D115 x 800	D115 x 117	D115 - 2PZ
	2,2	2,2			
	3	3			
	4	4			
	5,5	5,5	D115 x 1000	D115 x 117	D115 - 2PZ
	7,5	7,5			
16GS	1,5	1,5	D145 x 800	D145 x 158	D145 - 2PZ
	2,2	2,2			
	3	3			
	4	4			
	5,5	5,5	D145 x 1000	D145 x 158	D145 - 2PZ
	7,5	7,5			

gs_kit-raf50_en_c_ta

TECHNICAL APPENDIX

SUBMERSIBLE ELECTRIC PUMP INSTALLATION DIAGRAM

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.

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.
• 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.

A0033_B_SC

TECHNICAL APPENDIX

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 lenghts exceeding 20 meters.

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

A0034_B_SC

CALCULATING THE SPEED OF THE FLUID THAT FLOWS AROUND A SUBMERGED MOTOR AND SIZING OF THE COOLING SLEEVE
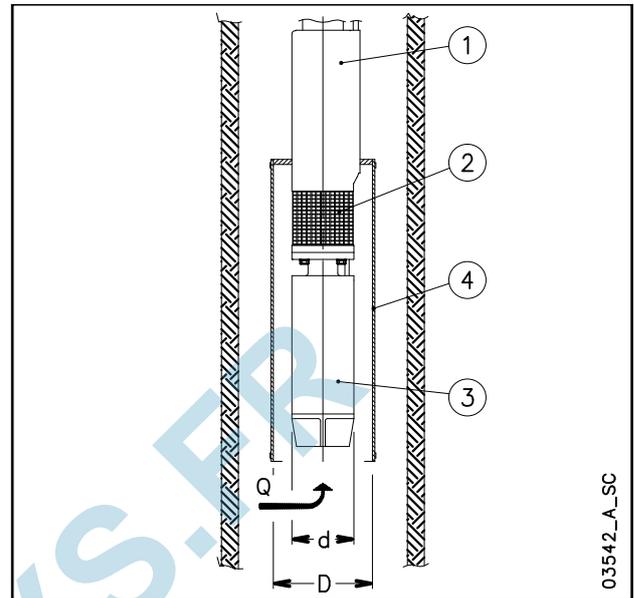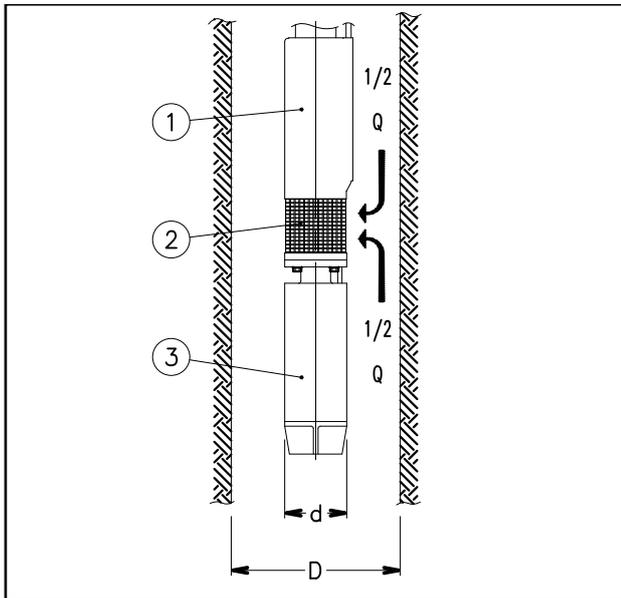
The following formula is used to verify whether the speed of the fluid that flows around the motor of a submersible pump is high enough to guarantee the proper cooling of the motor:

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

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] 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 m³/h = 0.0055 m³/s.
Speed of fluid v = (0.0055/2) / {π·[(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 [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 the electric pump OZ615/24 (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 of v_m = 0.20 m/s.
Cooling sleeve diameter D = {4·[(0.0042/(0.2·π)+(0.144)²/4]}^0.5 = 0.217 m.

TECHNICAL APPENDIX

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.
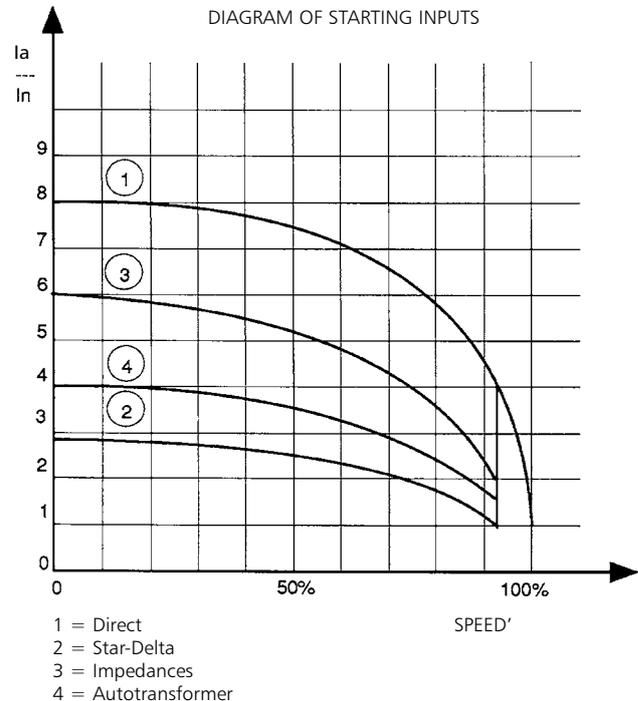The switch to the rated voltage occurs without any interruptions of the power supply.
Rated voltage   Un = 400 V

Starting current

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

Starting torque

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

DIAGRAM OF STARTING INPUTS

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

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.

TECHNICAL APPENDIX

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

TECHNICAL APPENDIX

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.
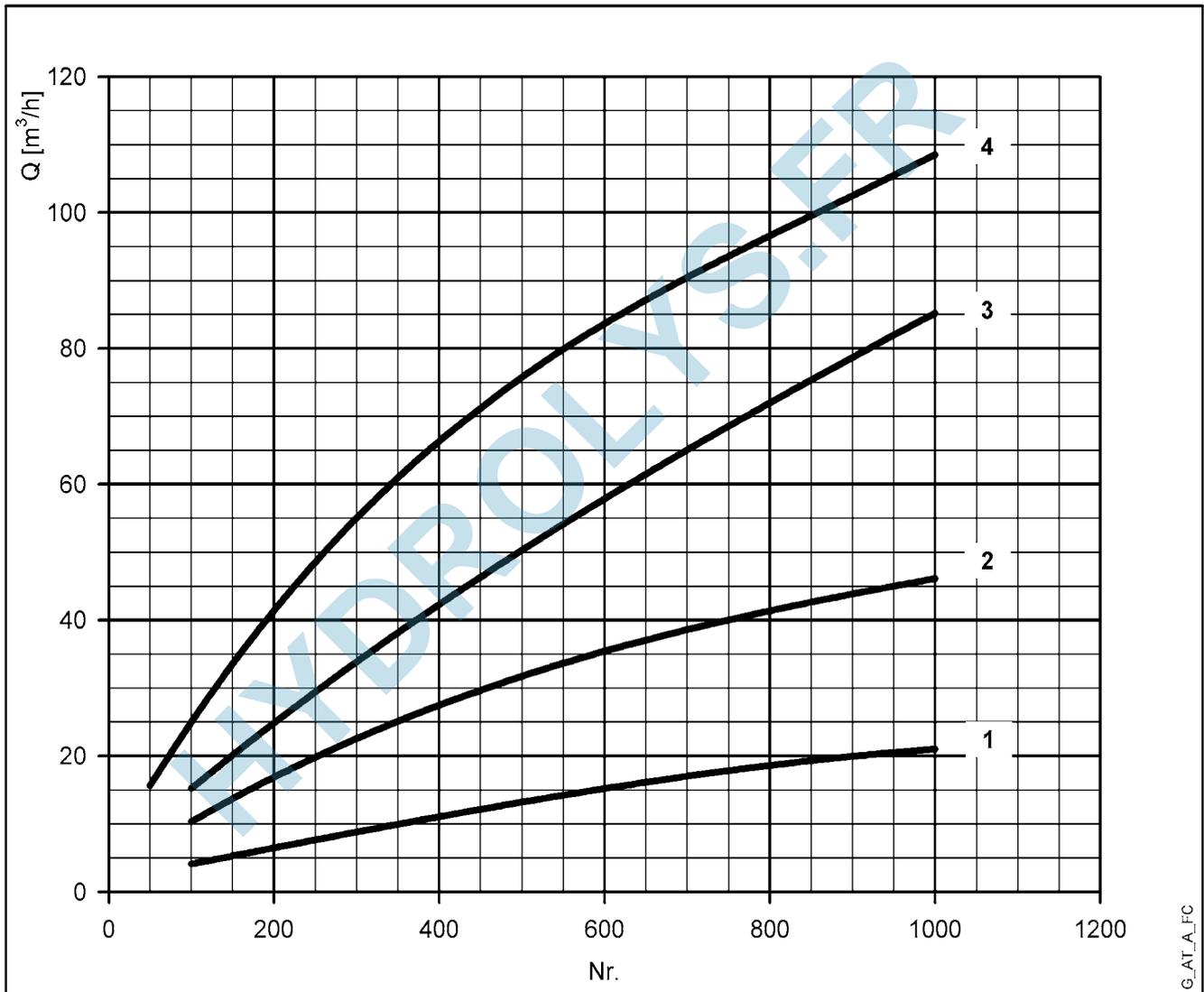
For seaside resorts, the flow rate must be increased by at least 20%.
1= Offices (N. of people)
2= Department stores (N. of people)
3= Nursing homes (N. of beds)
4= Hotels, residences (N. of beds)

TECHNICAL APPENDIX

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:

$$hp + hz \geq (NPSHr + 0.5) + hf + hpv \;\text{①}$$

where:

hp 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.

hz 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.

hf is the flow resistance in the suction line and its accessories, such as: fittings, foot valve, gate valve, elbows, etc.

hpv 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

Friction loss is shown in the tables at pages 117-118 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 $\gamma = 1$ 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, di 2,5 m.

For water at 15 °C

$hp = Pa / \gamma = 10,33m$, $hpv = Pv / \gamma = 0,174m$ (0,01701 bar)

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
VAPOUR PRESSURE ps AND ρ DENSITY OF WATER TABLE

t	T	ps	ρ	t	T	ps	ρ	t	T	ps	ρ
°C	K	bar	kg/dm³	°C	K	bar	kg/dm³	°C	K	bar	kg/dm³
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

TECHNICAL APPENDIX

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

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

m³/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

G-at-pct_a_th

hr = flow resistance for 100m of straight pipeline (m)

V = water speed (m/s)

TECHNICAL APPENDIX

FLOW RESISTANCE

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	DN											
TYPE	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 m³/h	Cubic feet per hour ft³/h	Cubic feet per minute ft³/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/m²	kilo Pascal kPa	bar bar	Pound force per square inch psi	Metre of water m H₂O	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 m³	Litre L	Millilitre ml	Imperial gallon imp. gal.	U.S. gallon US gal.	Cubic foot ft³
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	
				$°F = °C \times \frac{9}{5} + 32$
icing	273,1500	0,0000	32,0000	$°C = (°F - 32) \times \frac{5}{9}$
boiling	373,1500	100,0000	212,0000	

G-at_pp-en_b_sc

FURTHER PRODUCT SELECTION AND DOCUMENTATION

Xylect™

Xylect is pump solution selection software with an extensive online database of product information across the entire Lowara, and Vogel 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 Lowara and Vogel products.

The search can be made by:

- Application
- Product type
- Duty point

Xylect gives a detailed output:

- List with search results
- Performance curves (flow, head, power, efficiency, NPSH)
- Motor data
- Dimensional drawings
- Options
- Data sheet printouts
- Document downloads incl dxf files
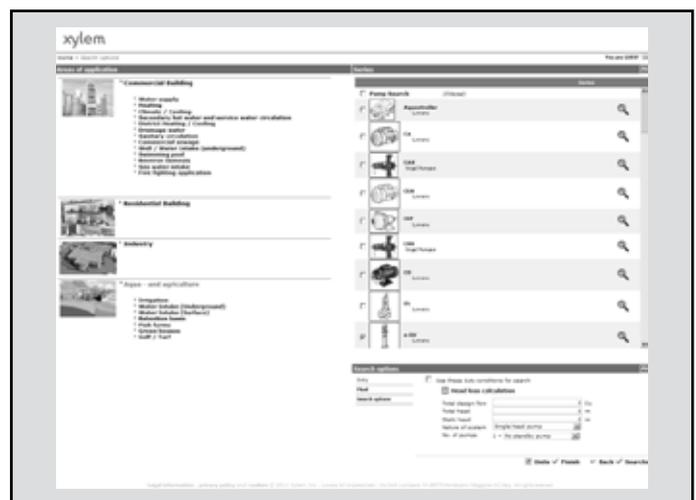
The search by application guides users not familiar with the product range to the right choice.

TECHNICAL APPENDIX

FURTHER PRODUCT SELECTION AND DOCUMENTATION
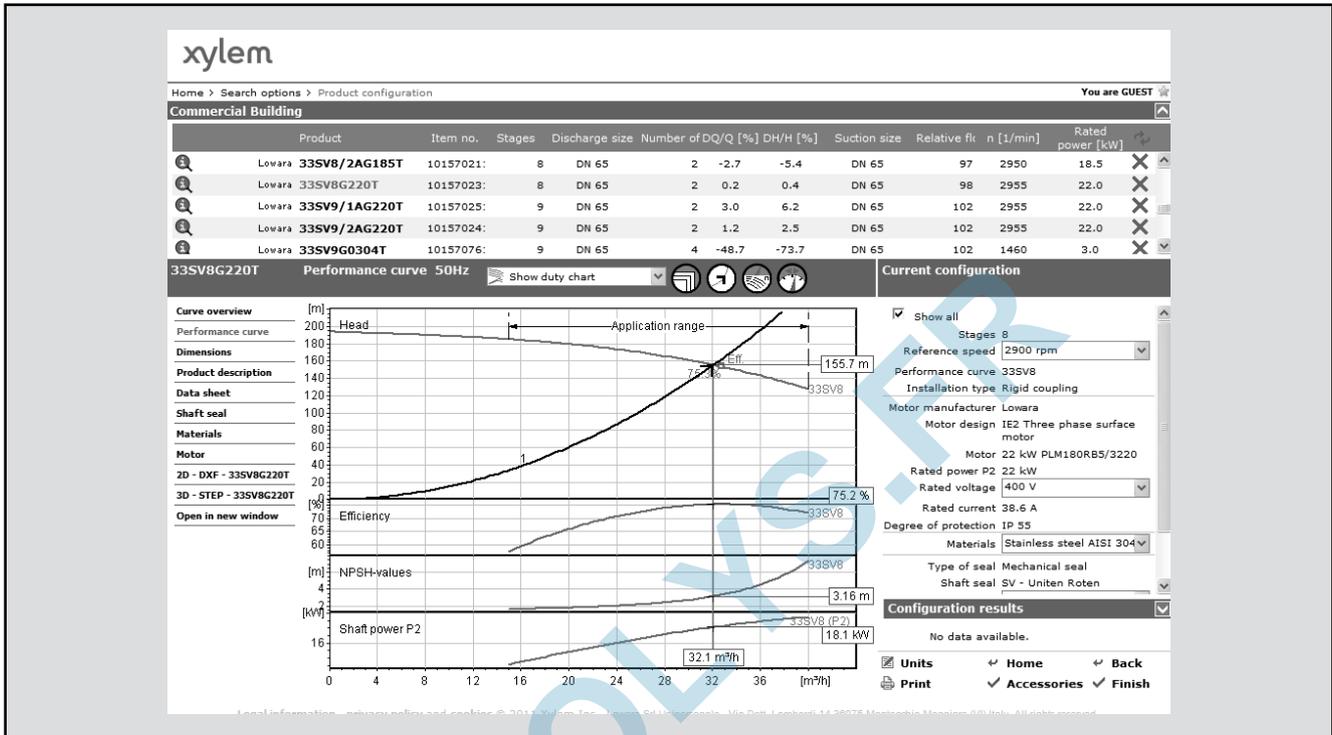
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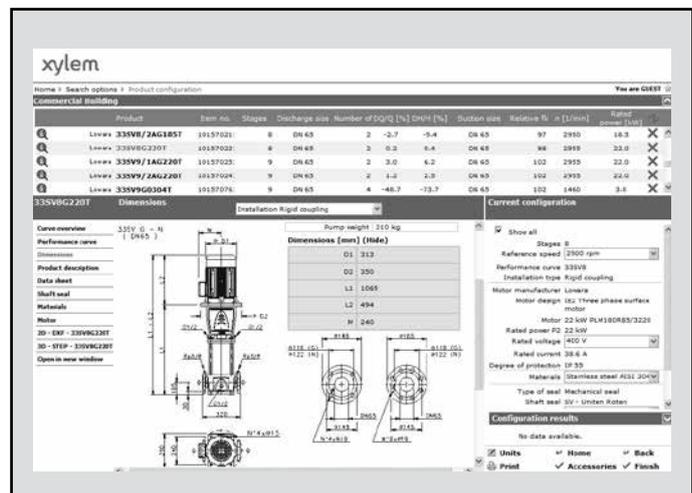
Dimensional drawings appear on the screen and can be downloaded in dxf format.

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For more information on how Xylem can help you, go to <u>xylem.com</u>.

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For information and technical support
Xylem Service Italia Srl

Via Dottor Vittorio Lombardi 14
36075 - Montecchio Maggiore (VI) - Italy
Tel. (+39) 0444 707111
Fax (+39) 0444 491043
www.lowara.com