SEG

0.9 - 4.0 kW

DIN - 60 Hz

be
think
innovate

GRUNDFOS

Table of contents

1. Introduction

Introduction

This data booklet describes Grundfos SEG sewage grinder pumps.

TM06 6105 0716

Fig. 1 SEG pump

The SEG pumps are designed with a grinder system which grinds solids into small pieces so that they can be led away through outlet pipes of a relatively small diameter.

The pumps are made of wear-resistant materials, such as cast iron and stainless steel. These materials ensure reliable operation.

The pumps are available with motors of 0.9 kW and up to and including 4.0 kW. All the motors are 2-pole motors.

The nominal diameter of the pump outlet port is DN 40 or DN 50.

The pumps are available for two types of installation:

- submerged installation on auto-coupling systems
- submerged installation, free-standing.

Applications

The SEG pumps are ideal for use in sparsely populated areas where gravity sewage systems are not available. Examples include small villages, farm areas, and areas with difficult topography, such as rocky terrains with large differences in levels, or any other area where a pressurised system offers advantages.

Product features

- Cable connection to motor via stainless-steel cable plug
- watertight cable entry of corrosion-resistant barrier of cast polyamide inside the cable plug housing
- clamp connection between motor and pump
- cartridge shaft seal
- heavy-duty bearings greased for life
- patented grinder system ensuring extremely high efficiency and reliable operation
- patented SmartTrim system enabling quick and easy impeller clearance adjustment in order to maintain peak performance
- thermal switches built into the motor windings providing protection against overheating
- explosion-proof motors for potentially explosive environments.

2. Identification

Type key

The type key covers the entire range of Grundfos SEG sewage grinder pumps. Each SEG pump can be identified by means of the type key.

Code	Example	SE	G	.40	.09		.Ex	.2	.1	.6	.03	
	Type range											
SE	Grundfos sewage pumps											
	Impeller type											
G	Grinder system in the pump inlet											
	Pump outlet											
40	Nominal diameter of pump outlet port [mm], DIN PN10 flange											
50												
K40	Nominal diameter of pump outlet port [mm]											
K50	JIS B 2239 10K, KS B 2332 10K, KS B 1511 10K flange											
	Output power, P2											
09	P2 = code number for type designation / 10 [kW]											
	Equipment in pump											
[ ]	Standard, without equipment											
	Pump version											
[ ]	Non-explosion-proof pump, CSA-approved											
Ex	Explosion-proof motor, CSA and FM-approved											
	Number of poles											
2	2-pole motor											
	Number of phases											
1	Single-phase motor											
[ ]	Three-phase motor											
	Frequency											
6	60 Hz											
	Voltage											
03	208-230 V											
0G	380 V											
0H	460 V											
0M	200-230 V											
Z	**Custom-built pump**											

Nameplate

The nameplate states the operating data and approvals applying to the pump.

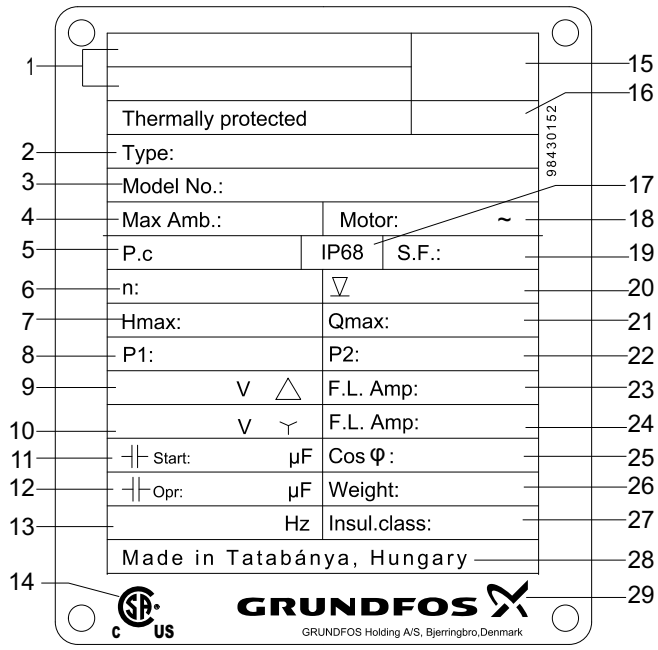


Fig. 2 SEG nameplate

Pos.	Description
1	FM-description
2	Type designation
3	Product number + serial number
4	Maximum liquid temperature
5	Production code (YYWW)
6	Speed [rpm]
7	Maximum head [m]
8	Rated power input [kW]
9	Rated voltage, Δ
10	Rated voltage, Y
11	Starting capacitor [µF]
12	Run capacitor [µF]
13	Frequency [Hz]
14	Electrical safety*
15	Approval

* For USA and Canada

Pos.	Description
16	Mark for continuously operated motor
17	Enclosure class to IEC
18	Phases
19	Motor safety factor
20	Maximum installation depth [m]
21	Maximum flow rate [l/s]
22	Rated power output
23	Rated current, Δ
24	Rated current, Y
25	Cos φ, 1/1 load
26	Net weight [kg]
27	Insulation class / temperature rise
28	Place of production
29	Grundfos logo

3. Selection of product

Ordering a pump

When ordering a pump, you need to take the following aspects into consideration:

- pump type
- custom-built variation (option)
- accessories
- controller
- explosion-proof version.

Pump type

When you have selected the pump type, you can identify the specific pump that best meets your needs in sections *Product range* on page 9, and *Type key* on page 4.

The list below is a detailed description of the product you get if you order the following pump:

Pump	Product number
SEG.40.09.EX.2.1.603	98280832

- Pump as specified in the type key.
- 10 metres of cable.
- Paint: NSC 9000 N / RAL 9005 (black), gloss code 30 ± 10 (according ISO 2813), thickness of minimum 100 µm and maximum 200 µm.
- Thermal switches built into the motor windings.
- Tested according to ISO 9906:2012, grade 3B.

See section *Performance curves and technical data* on page 24 for selection of a pump.

Note: Pump-specific data can also be found on www.grundfos.com (Grundfos Product Center) by entering the product number 98280832.

For further information on Grundfos Product Center, see page 42.

Custom-built variants

The pumps can be customised to meet individual requirements. Many pump features and options are available for customisation, such as explosion-proof versions, cable lengths or special materials.

Accessories

Depending on installation type and pump variant, accessories may be required. See section *Accessories* on page 38 for selection of the correct accessories.

Note: Ordered accessories are not fitted from factory.

Controller

The following controllers are available:

- Dedicated Controls.
  See page 39.
- LC and LCD 107 operated by air bells.
  See page 40.
- LC and LCD 108 operated by float switches.
  See page 40.
- LC and LCD 110 operated by electrodes.
  See page 40.
- CU 100.
  See page 40.

Explosion-proof version

The SEG pumps are available in explosion-proof versions.

The pumps have CSA approval according to UL778 and C22.2 No 108 and FM approval according to FM 3600, FM 3615 and FM 3615.80.

4. Performance range

Performance overviews

Figures 3 and 4 shows the performance ranges of SEG pumps as well as the explosion-proof versions. They give an overview of the various sizes.

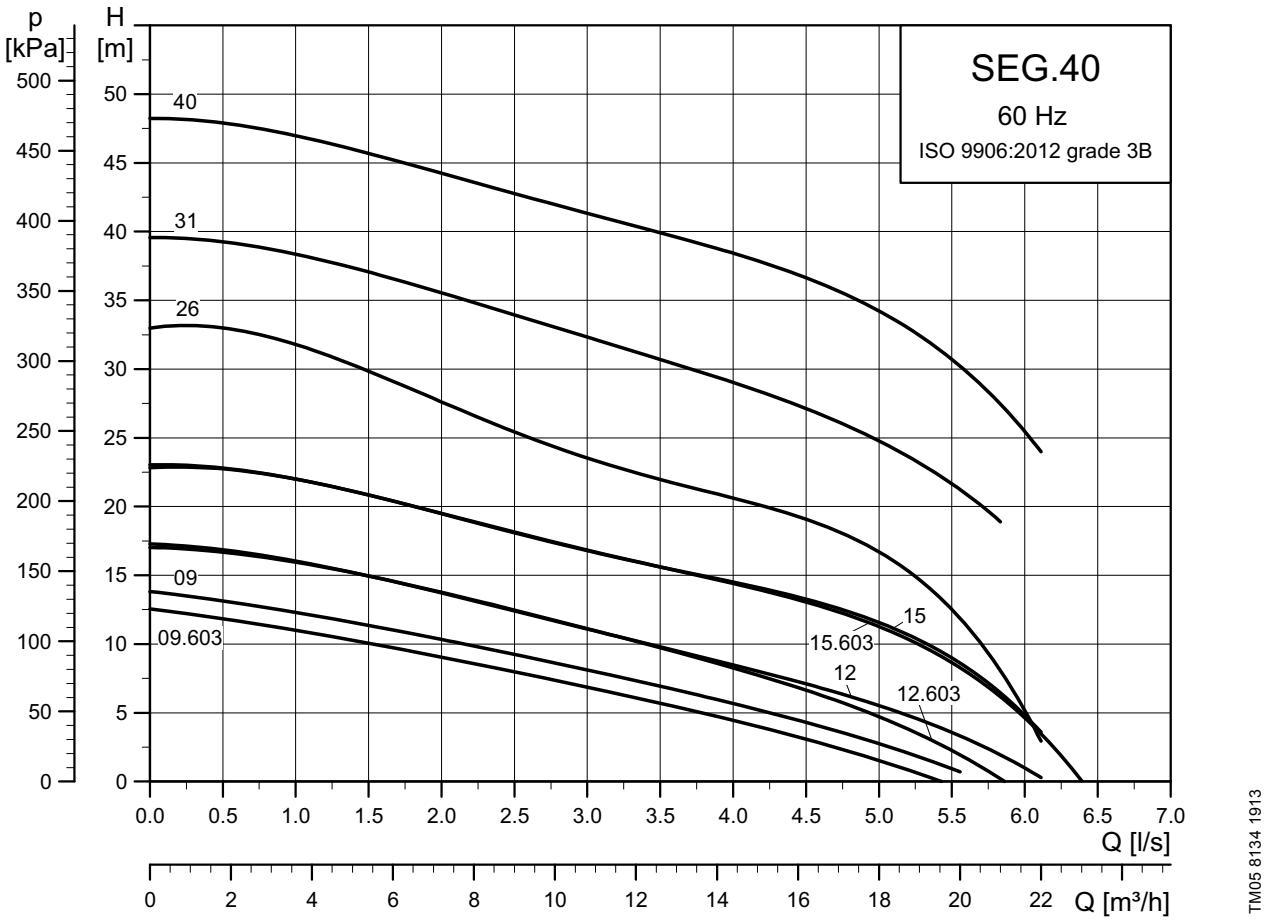


Fig. 3 Performance range for pumps with DN 40 outlet flange

Channel-impeller pumps	Curve number
SEG.40.09.(EX).2.1.603	09.603
SEG.40.09.(EX).2.60G/H/M	09
SEG.40.12.(EX).2.1.603	12.603
SEG.40.12.(EX).2.60G/H/M	12
SEG.40.15.(EX).2.1.603	15.603
SEG.40.15.(EX).2.60G/H/M	15
SEG.40.26.(EX).2.60G/H/M	26
SEG.40.31.(EX).2.60G/H/M	31
SEG.40.40.(EX).2.60G/H/M	40

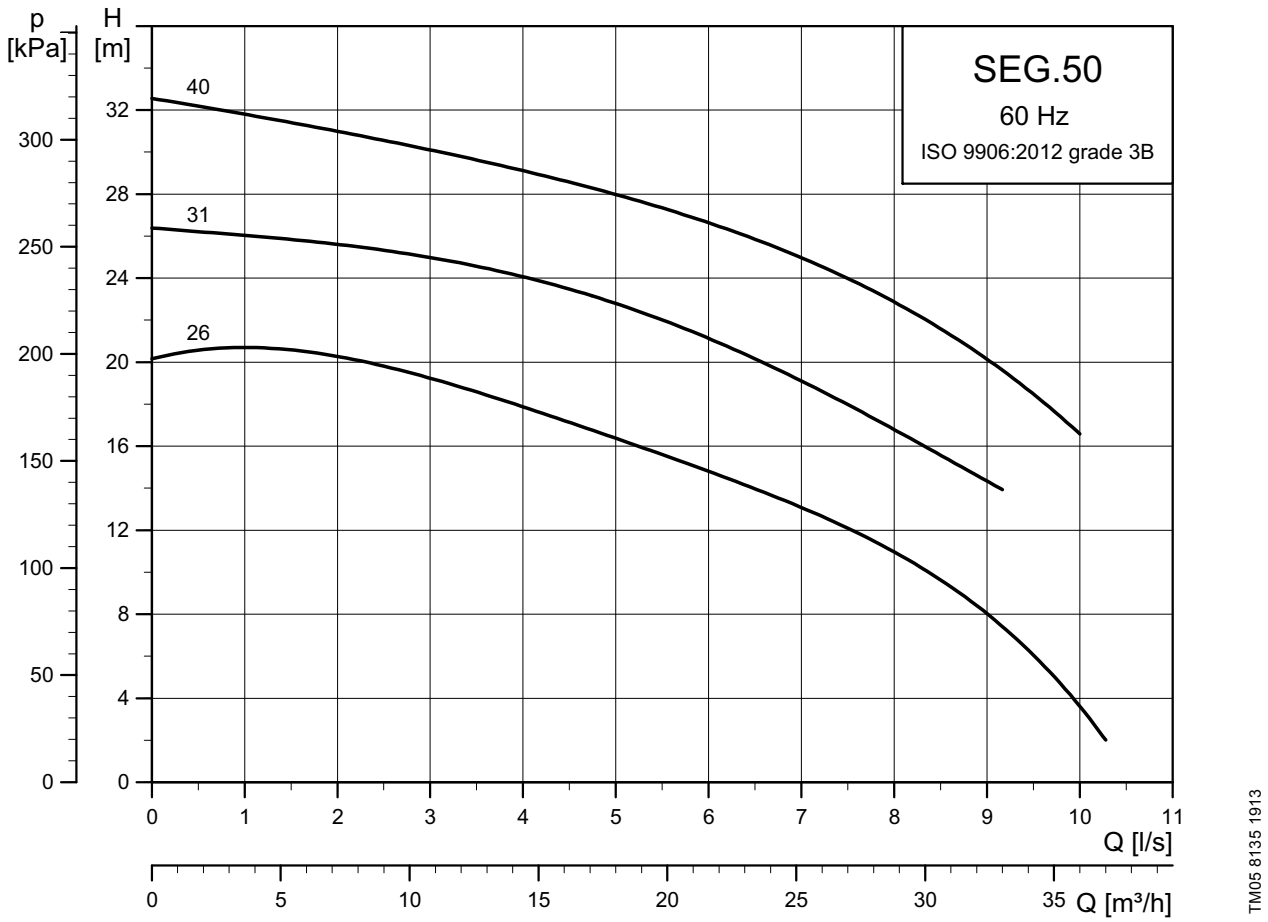


Fig. 4 Performance range for pump DN 50 outlet flange

Channel-impeller pumps	Curve number
SEG.50.26.(EX).2.60G/H/M	26
SEG.50.31.(EX).2.60G/H/M	31
SEG.50.40.(EX).2.60G/H/M	40

5. Product range

Standard pumps

SEG pumps - 40 mm outlet flange

Pump type	Supply voltage [V]	Starting method	Cable length [m]	Thermal protection	Product number
SEG.40.09.2.1.603	1 x 230	DOL	10	Thermal switch	98580831
SEG.40.09.2.60G	3 x 380				98280814
SEG.40.09.2.60H	3 x 460				98280837
SEG.40.09.2.60M	3 x 200-230				98280729
SEG.40.12.2.1.603	1 x 230				98280833
SEG.40.12.2.60G	3 x 380				98280816
SEG.40.12.2.60H	3 x 460				98280839
SEG.40.12.2.60M	3 x 200-230				98280748
SEG.40.15.2.1.603	1 x 230				98280835
SEG.40.15.2.60G	3 x 380				98280819
SEG.40.15.2.60H	3 x 460				98280841
SEG.40.15.2.60M	3 x 200-230				98280750
SEG.40.26.2.60G	3 x 380				98280821
SEG.40.26.2.60H	3 x 460				98280843
SEG.40.26.2.60M	3 x 200-230				98280803
SEG.40.31.2.60G	3 x 380				98280823
SEG.40.31.2.60H	3 x 460				98280845
SEG.40.31.2.60M	3 x 200-230				98280805
SEG.40.40.2.60G	3 x 380				98280825
SEG.40.40.2.60H	3 x 460				98280847
SEG.40.40.2.60M	3 x 200-230				98280808

SEG pumps - 50 mm outlet flange

Pump type	Supply voltage [V]	Starting method	Cable length [m]	Thermal protection	Product number
SEG.50.26.2.60G	3 x 380	DOL	10	Thermal switch	98367001
SEG.50.26.2.60H	3 x 460				98367006
SEG.50.26.2.60M	3 x 200-230				98366986
SEG.50.31.2.60G	3 x 380				98367011
SEG.50.31.2.60H	3 x 460				98367014
SEG.50.31.2.60M	3 x 200-230				98367009
SEG.50.40.2.60G	3 x 380				98367250
SEG.50.40.2.60H	3 x 460				98367248
SEG.50.40.2.60M	3 x 200-230				98367245

For accessories, see section *Accessories* on page 38.

SEG pumps - JIS and KS flange (Japan and Korea)

Pump type	Supply voltage [V]	Starting method	Cable length [m]	Thermal protection	Product number
SEG.K40.09.2.1.603	1 x 230	DOL	10	Thermal switch	98281469
SEG.K40.09.2.60G	3 x 380				98281166
SEG.K40.09.2.60H	3 x 460				98281485
SEG.K40.09.2.60M	3 x 200-230				98280949
SEG.K40.12.2.1.603	1 x 230				98281477
SEG.K40.12.2.60G	3 x 380				98281170
SEG.K40.12.2.60H	3 x 460				98281487
SEG.K40.12.2.60M	3 x 200-230				98281155
SEG.K40.15.2.1.603	1 x 230				98281481
SEG.K40.15.2.60G	3 x 380				98281182
SEG.K40.15.2.60H	3 x 460				98281489
SEG.K40.15.2.60M	3 x 200-230				98281158
SEG.K40.26.2.60G	3 x 380				98281186
SEG.K40.26.2.60H	3 x 460				98281492
SEG.K40.26.2.60M	3 x 200-230				98281160
SEG.K40.31.2.60G	3 x 380				98281188
SEG.K40.31.2.60H	3 x 460				98281495
SEG.K40.31.2.60M	3 x 200-230				98281162
SEG.K40.40.2.60G	3 x 380				98281336
SEG.K40.40.2.60H	3 x 460				98281499
SEG.K40.40.2.60M	3 x 200-230				98281164

SEG pumps - JIS and KS flange (Japan and Korea)

Pump type	Supply voltage [V]	Starting method	Cable length [m]	Thermal protection	Product number
SEG.K50.26.2.60G	3 x 380	DOL	10	Thermal switch	98367265
SEG.K50.26.2.60M	3 x 200-230				98367263
SEG.K50.31.2.60G	3 x 380				98367294
SEG.K50.31.2.60H	3 x 460				98367297
SEG.K50.31.2.60M	3 x 200-230				98367292
SEG.K50.40.2.60G	3 x 380				98367330
SEG.K50.40.2.60H	3 x 460				98367344
SEG.K50.40.2.60M	3 x 200-230				98367299

For accessories, see section *Accessories* on page 38.

Explosion-proof pumps

SEG pumps - 40 mm outlet flange

Pump type	Supply voltage [V]	Starting method	Cable length [m]	Thermal protection	Product number
SEG.40.09.EX.2.1.603	1 x 230	DOL	10	Thermal switch	98280832
SEG.40.09.EX.2.60G	3 x 380				98280815
SEG.40.09.EX.2.60H	3 x 460				98280838
SEG.40.09.EX.2.60M	3 x 200-230				98280747
SEG.40.12.EX.2.1.603	1 x 230				98280834
SEG.40.12.EX.2.60G	3 x 380				98280817
SEG.40.12.EX.2.60H	3 x 460				98280840
SEG.40.12.EX.2.60M	3 x 200-230				98280749
SEG.40.15.EX.2.1.603	1 x 230				98280836
SEG.40.15.EX.2.60G	3 x 380				98280820
SEG.40.15.EX.2.60H	3 x 460				98280842
SEG.40.15.EX.2.60M	3 x 200-230				98280801
SEG.40.26.EX.2.60G	3 x 380				98280822
SEG.40.26.EX.2.60H	3 x 460				98280844
SEG.40.26.EX.2.60M	3 x 200-230				98280804
SEG.40.31.EX.2.60G	3 x 380				98280824
SEG.40.31.EX.2.60H	3 x 460				98280846
SEG.40.31.EX.2.60M	3 x 200-230				98280806
SEG.40.40.EX.2.60G	3 x 380				98280826
SEG.40.40.EX.2.60H	3 x 460				98280849
SEG.40.40.EX.2.60M	3 x 200-230				98280810

SEG pumps - 50 mm outlet flange

Pump type	Supply voltage [V]	Starting method	Cable length [m]	Thermal protection	Product number
SEG.50.26.EX.2.60G	3 x 380	DOL	10	Thermal switch	98367004
SEG.50.26.EX.2.60H	3 x 460				98367008
SEG.50.26.EX.2.60M	3 x 200-230				98366988
SEG.50.31.EX.2.60G	3 x 380				98367013
SEG.50.31.EX.2.60H	3 x 460				98367015
SEG.50.31.EX.2.60M	3 x 200-230				98367010
SEG.50.40.EX.2.60G	3 x 380				98367261
SEG.50.40.EX.2.60H	3 x 460				98367249
SEG.50.40.EX.2.60M	3 x 200-230				98367246

For accessories, see section *Accessories* on page 38.

SEG pumps - K40 outlet flange (Japan and Korea)

Pump type	Supply voltage [V]	Starting method	Cable length [m]	Thermal protection	Product number
SEG.K40.09.EX.2.1.603	1 x 230	DOL	10	Thermal switch	98281470
SEG.K40.09.EX.2.60G	3 x 380				98281169
SEG.K40.09.EX.2.60H	3 x 460				98281486
SEG.K40.09.EX.2.60M	3 x 200-230				98280950
SEG.K40.12.EX.2.1.603	1 x 230				98281479
SEG.K40.12.EX.2.60G	3 x 380				98281181
SEG.K40.12.EX.2.60H	3 x 460				98281488
SEG.K40.12.EX.2.60M	3 x 200-230				98281157
SEG.K40.15.EX.2.1.603	1 x 230				98281483
SEG.K40.15.EX.2.60G	3 x 380				98281184
SEG.K40.15.EX.2.60H	3 x 460				98281490
SEG.K40.15.EX.2.60M	3 x 200-230				98281159
SEG.K40.26.EX.2.60G	3 x 380				98281187
SEG.K40.26.EX.2.60H	3 x 460				98281493
SEG.K40.26.EX.2.60M	3 x 200-230				98281161
SEG.K40.31.EX.2.60G	3 x 380				98281255
SEG.K40.31.EX.2.60H	3 x 460				98281496
SEG.K40.31.EX.2.60M	3 x 200-230				98281163
SEG.K40.40.EX.2.60G	3 x 380				98281419
SEG.K40.40.EX.2.60H	3 x 460				98281500
SEG.K40.40.EX.2.60M	3 x 200-230				98281165

SEG pumps - JIS and KS flange (Japan and Korea)

Pump type	Supply voltage [V]	Starting method	Cable length [m]	Thermal protection	Product number
SEG.K50.26.EX.2.60G	3 x 380	DOL	10	Thermal switch	98367268
SEG.K50.26.EX.2.60M	3 x 200-230				98367264
SEG.K50.31.EX.2.60G	3 x 380				98367295
SEG.K50.31.EX.2.60H	3 x 460				98367298
SEG.K50.31.EX.2.60M	3 x 200-230				98367293
SEG.K50.40.EX.2.60G	3 x 380				98367342
SEG.K50.40.EX.2.60H	3 x 460				98367345
SEG.K50.40.EX.2.60M	3 x 200-230				98367329

For accessories, see section *Accessories* on page 38.

6. Variants

List of variants

Motor

Standard cables	Cable B, B 7G AWG16	15 m 20 m 25 m 30 m 40 m 50 m
Ex cables	Cable B, EX 7G AWG16	15 m 20 m 25 m 30 m 40 m 50 m
Screened power cables for frequency converters	Screened cable, B	10 m 15 m 20 m 25 m 30 m 40 m
Cable protection	For 7-core cable	
Special motor	For special voltage with or without PTC, etc.	Contact Grundfos

Tests

Test at specified duty on standard impeller curve		
Additional test of entire QH curve (including report)	Five to ten flow rates from pump performance curve	
Different test standard	Efficiency guaranteed by Grundfos	ISO 9906:2012 grade 2B/2U or 1B tolerances
Witness test	Contact Grundfos.	

Certificates*

CSA-approved pump report	Special Grundfos report. Contact Grundfos.	
Certificate of compliance with order	According to EN 10204 2.1.	According to ISO 9906:2012
Pump certificate	According to EN 10204 2.2.	According to ISO 9906:2012
Inspection certificate	According to EN 10204 3.1.	According to ISO 9906:2012
Material specification report	According to EN 10204 3.1B.	
Material report with certificate	According to EN 10204 3.2.	Material supplier information
Inspection certificate, Lloyds Register	According to EN 10204 3.2.	
Inspection certificate, DNV (Det Norske Veritas)	According to EN 10204 3.2.	
Inspection certificate, Germanisher Lloyd	According to EN 10204 3.2.	
Inspection certificate, American Bureau of Shipping	According to EN 10204 3.2.	
Inspection certificate, Bureau Veritas	According to EN 10204 3.2.	
Inspection certificate, Registro Italiano Navale Argenture	According to EN 10204 3.2.	
Other 3rd party test certificate	Contact Grundfos.	

* For customised duty point or grades with 5-point test certificate, please order together with pump.

Miscellaneous

Special packaging	Contact Grundfos.
Special nameplate	Contact Grundfos.
Other variants	Contact Grundfos.
Chemical-resistant shaft seal	FKM, standard (NBR)
Chemical-resistant pump	FKM, standard (NBR)
Internal surface treatment	Ceramic coating (impeller and pump housing)
Internal surface treatment	Extra epoxy (CED) coating
Top coating	Black NCS 9000 N (RAL 9005)
	Other colour

7. Construction

Material specification

The position numbers in the table below refer to the sectional drawings and exploded views on the following pages.

Pos.	Description	Material	EN standard	AISI/ASTM
6a	Pin	Stainless steel	-	-
7a	Rivet	Stainless steel	-	-
9a	Key	Stainless steel	-	-
26a	O-rings	NBR	-	-
37	O-ring	NBR	-	-
37a	O-rings	NBR	-	-
44	Grinder ring	Stainless steel	1.4542	630
45	Grinder head	Stainless steel	1.4542	630
48	Stator	-	-	-
49	Impeller	Cast iron	EN-GJL-200	-
50	Pump housing	Cast iron	EN-GJL-200	-
55	Stator housing	Cast iron	EN-GJL-200	-
58	Shaft seal carrier	Cast iron	EN-GJL-200	-
66	Locking ring	Stainless steel	-	-
68	Adjusting nut	Stainless steel	1.4057	431
76	Nameplate	Stainless steel	1.4301	304
92	Clamp	Stainless steel	1.4301	304
102	O-ring	NBR	-	-
103	Bush	Stainless steel	1.4057	431
104	Seal ring	NBR	-	-
105	Shaft seal	Primary seal (0.9 to 1.5 kW): SiC/SiC Secondary seal (0.9 to 1.5 kW): lip seal, NBR Primary seal (2.6 to 4.0 kW): SiC/SiC Secondary seal (2.6 to 4.0 kW): carbon/aluminium oxide Other components: NBR, stainless steel	-	-
107	O-rings	NBR	-	-
112a	Locking ring	Stainless steel	-	-
150a	Stator in housing complete	-	-	-
153	Bearing	Up to and including 1.5 kW: 6303 2.6 kW and up: 3205	-	-
153a	Lock washer	Stainless steel	-	-
153b	Locking ring	Stainless steel	-	-
154	Bearing	Up to and including 1.5 kW: 6201 2.6 kW and up: 6205	-	-
155	Oil chamber	Cast iron	EN-GJL-200	-
158	Corrugated spring	Steel	-	-
159	O-ring	NBR	-	-
172	Rotor/shaft	Shaft part at rotor: steel Shaft end at hydraulics: stainless steel	1.1181 1.4301	304 -
173	Screw	Steel	-	-
173a	Washer	Steel	-	-
176	Inner plug part	PET	-	-
181	Outer plug part	CR rubber, cable H07RN-F	1.4308	CF-8
188a	Screw	Stainless steel	-	-
190	Lifting bracket	Stainless steel	1.4308	CF-8
193	Oil screw	Stainless steel	-	-
193a	Oil	Shell Ondina X420	-	-
194	Gasket	Nylon	-	-
198	O-ring	NBR	-	-
	Paint	Two-component epoxy	-	-

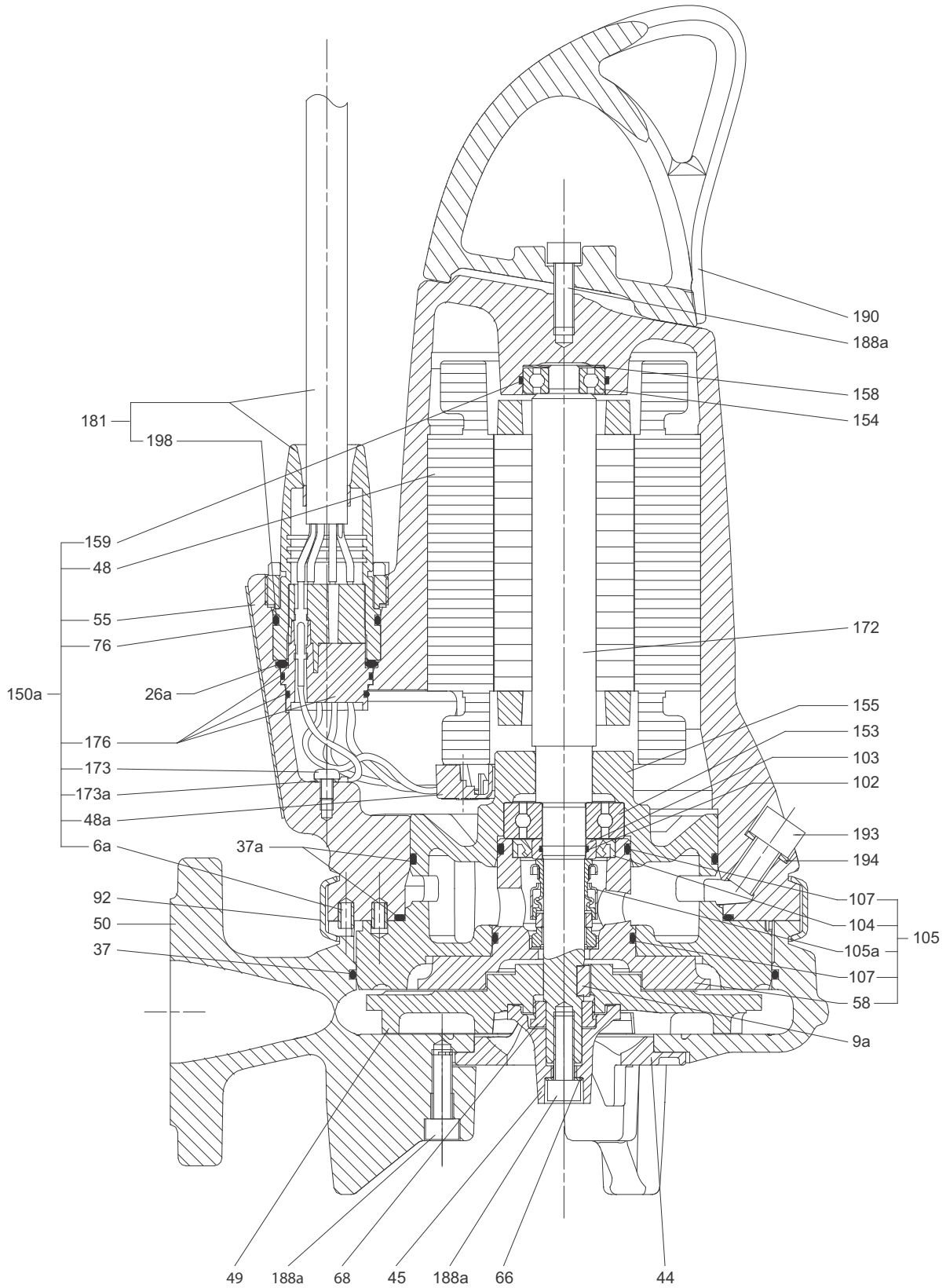


Fig. 5 Sectional drawing of SEG pumps, 0.9, 1.2 and 1.5 kW

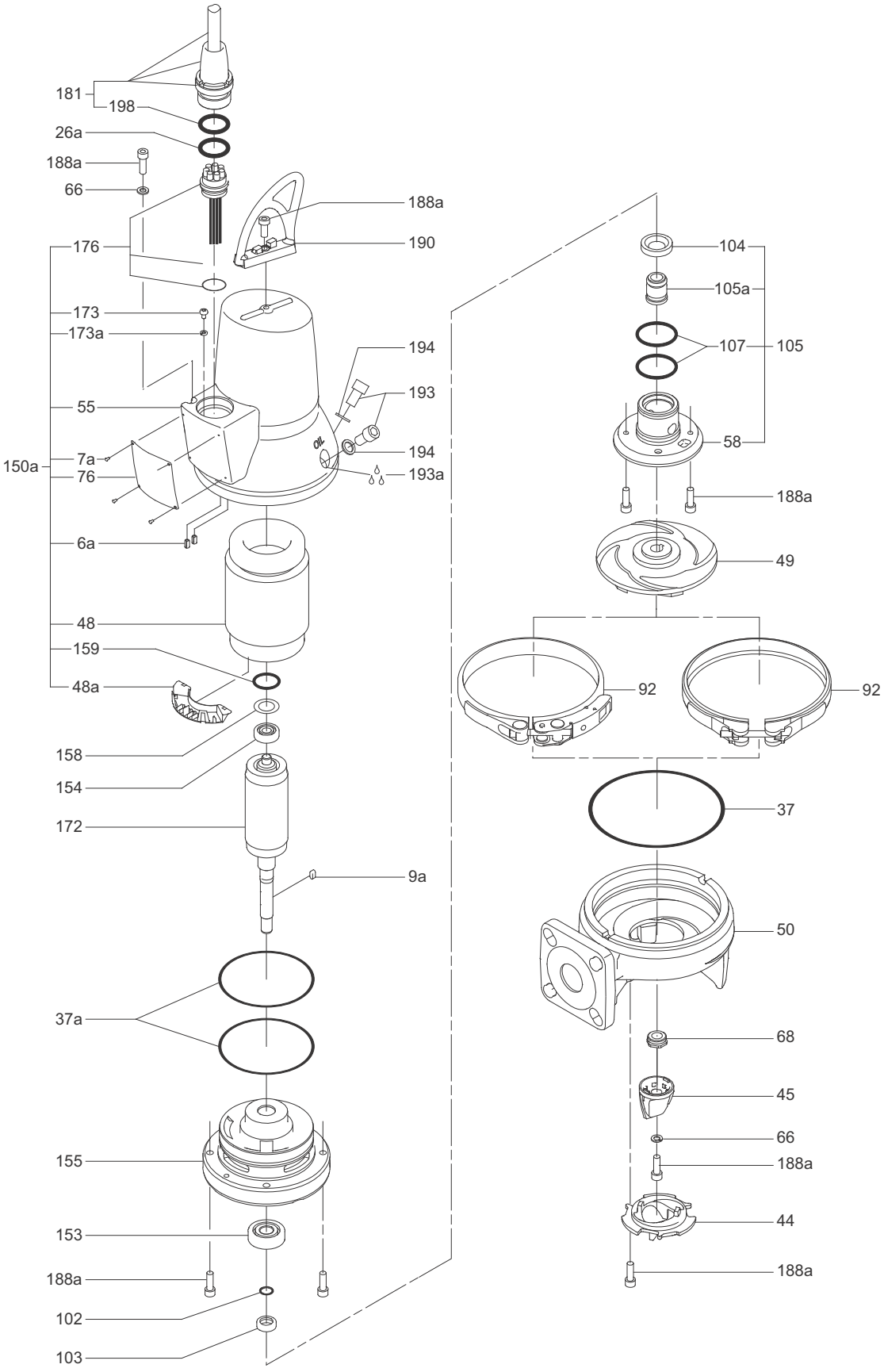


Fig. 6 Exploded view of SEG pumps, 0.9, 1.2 and 1.5 kW

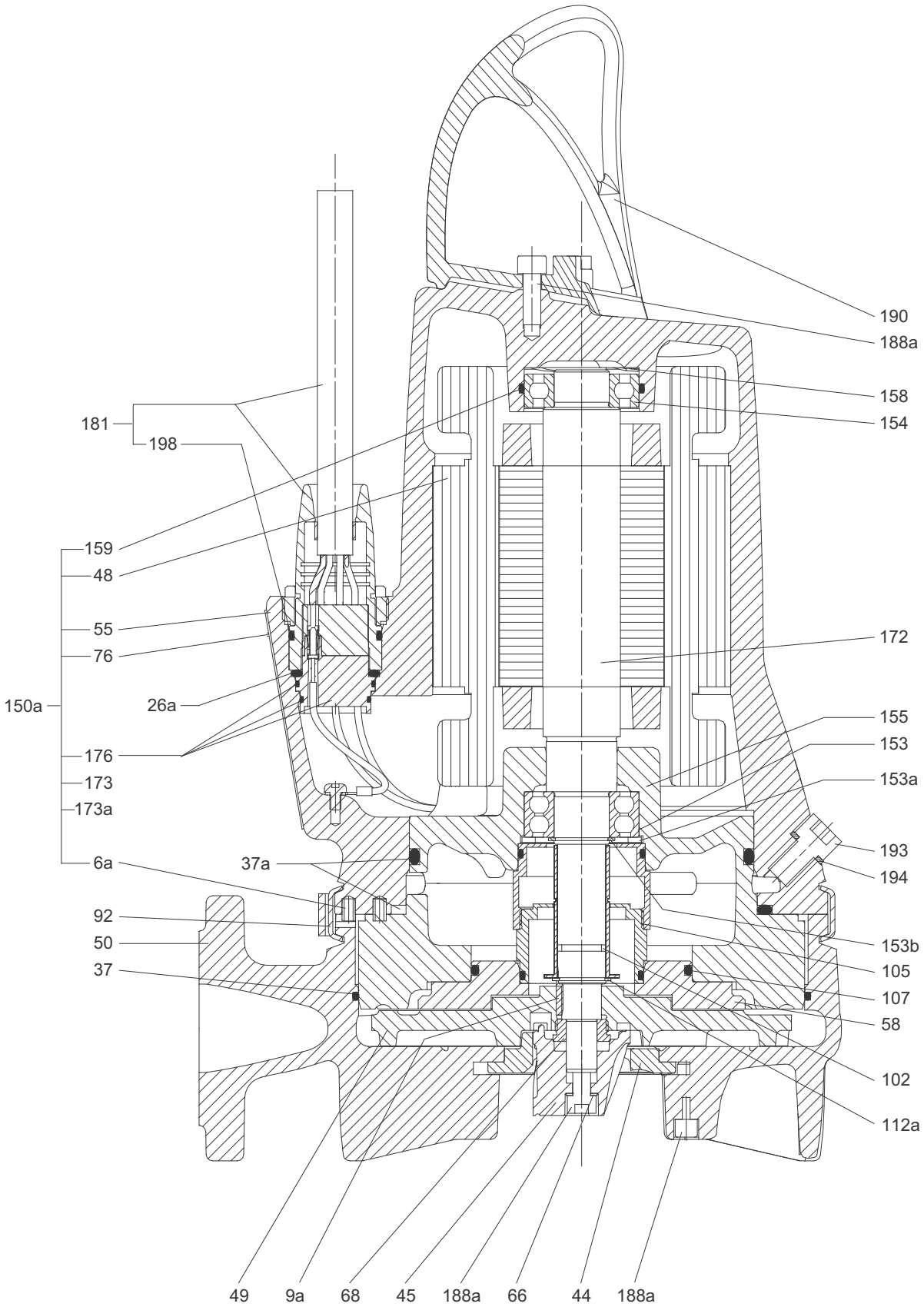


Fig. 7 Sectional drawing of SEG pumps, 2.6, 3.1 and 4.0 kW

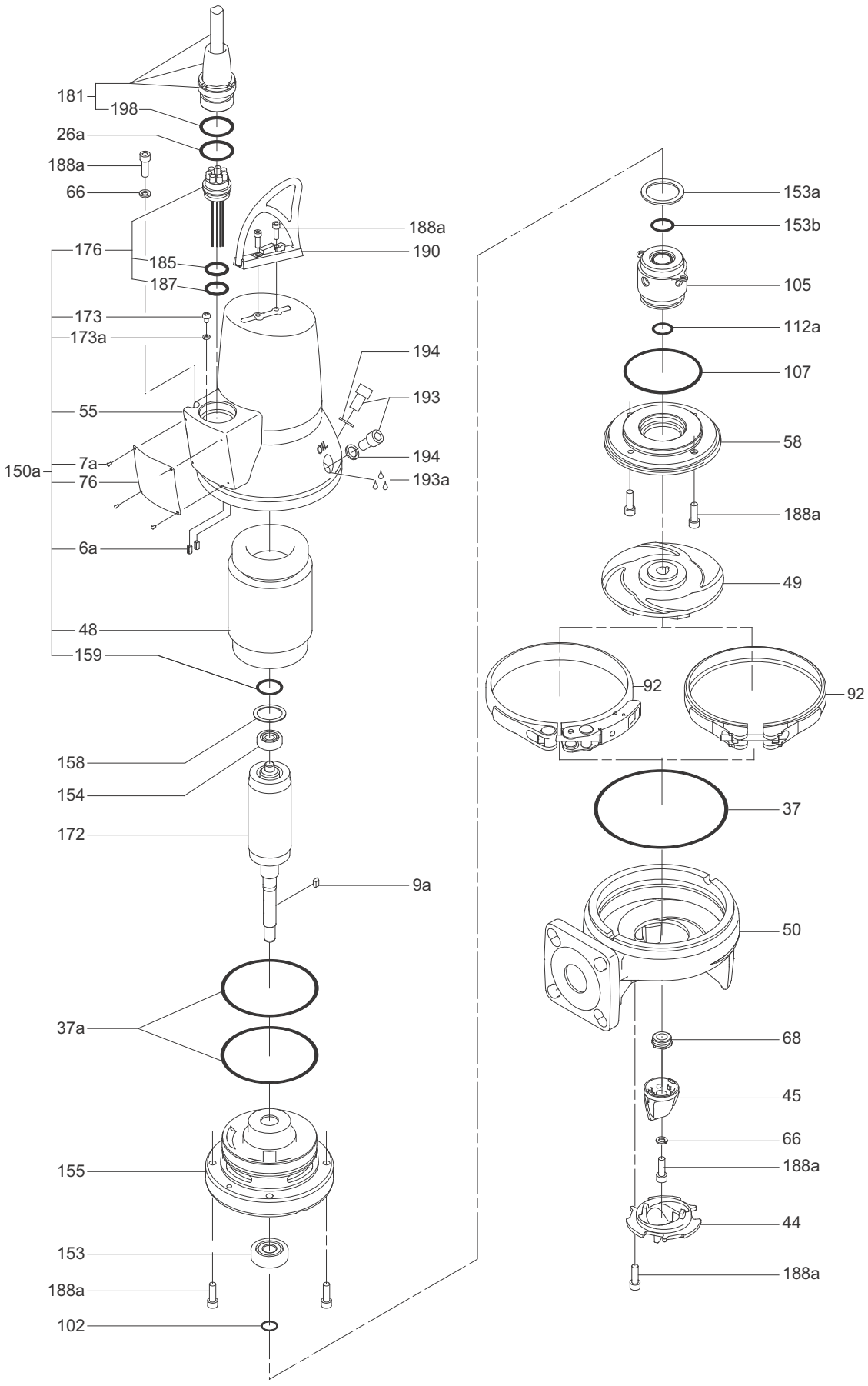


Fig. 8 Exploded view of SEG pumps, 2.6, 3.1 and 4.0 kW

8. Product description

Features

Ball bearings

The ball bearings are greased for life.

Top bearings:

- Up to and including 1.5 kW:
  Single-row ball bearing 6301.
- 2.6 kW and up:
  Single-row ball bearing 6205.

Bottom bearings:

- Up to and including 1.5 kW:
  Single-row ball bearing 6303.
- 2.6 kW and up:
  Angular-contact ball bearing 3205.

Shaft seal

The SEG range is available with two shaft seal variants. Both variants are fitted as cartridge seals. The shaft seal separates the motor from the pumped liquid.

Pumps up to and including 1.5 kW have a silicon carbide/silicon carbide (SiC/SiC) mechanical shaft seal as primary seal and a lip seal as secondary seal. In connection with service, the mechanical shaft seal and the lip seal are supplied as one unit ready for fitting.

Pumps of 2.6 kW and up have a double seal consisting of a SiC/SiC mechanical shaft seal as primary seal and a carbon/aluminium oxide mechanical shaft seal as secondary seal.

Motor

The motor is a watertight, totally encapsulated motor.

Insulation class: F (155 °C).

Supply voltage tolerance: - 10 %/+ 6 %.

Temperature class: F (105 °C).

Enclosure class: IP68.

For motor protection and sensors, see section *Sensors* on page 19.

Surface treatment

Grundfos SEG pumps are given the following surface treatment:

- cataphoresis treatment for all cast iron parts
- powder coating: NSC 9000 N (black), gloss code 30, thickness of minimum 100 µm and maximum 200 µm.

Power supply cables

Standard cable

Cable type	Outer cable diameter [mm]	Bending radius	
		Fixed	Free
7G AWG16	15.5 ± 0.5	60	90

EMC cable

Cable type	Outer cable diameter [mm]	Bending radius	
		Fixed	Free
EX 7G AWG16	17.5 ± 0.5	85	170

As standard, the cables are 10 metres long. Other cable lengths are available on request. See section *List of variants* on page 13.

The number and dimension of cables depend on the motor size.

Cable entry

The stainless-steel plug is fastened with a union nut. The nut and O-rings provide sealing against ingress of liquid.

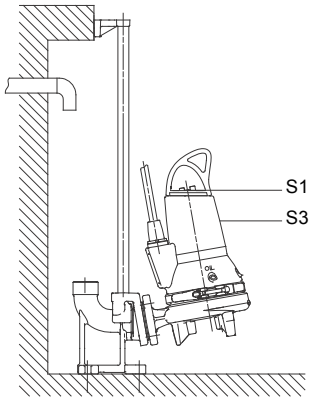
The plug is filled with a special material that is cast into the plug around the leads of the cable. This prevents the ingress of water into the motor through the cable in case of cable breakage or adverse handling in connection with installation or service.

Sensors

As standard, the pump has two thermal switches incorporated in the motor windings to protect the motor against overheating.

Operating conditions

The pumps are designed for intermittent operation (S3). When completely submerged, the pumps can also operate continuously (S1).

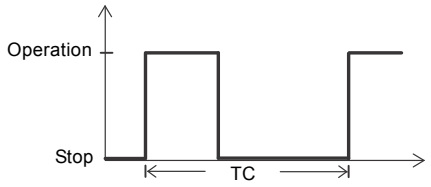


TM06 5749 0116

Fig. 9 Operation levels

S3, intermittent operation

The S3 is series of identical duty cycles TC, each a constant load for a period, followed by a rest period. Thermal equilibrium is not reached during the cycle. See fig. 10.



TM04 4527 1509

Fig. 10 S3 operation

S1, continuous operation

In this operating mode, the pump can operate continuously without having to be stopped for cooling. See fig. 11. Being completely submerged, the pump is sufficiently cooled by the surrounding liquid. See fig. 9.

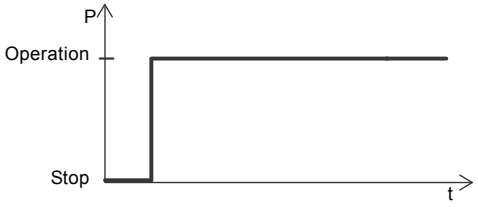


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Fig. 11 S1 operation

Pumped liquids

pH value: 4-10.

Liquid temperature: 0-40 °C.

When pumping liquids with a density and/or a kinematic viscosity higher than that of water, use motors with correspondingly higher outputs.

For short periods (maximum 3 minutes), temperatures up to 60 °C are permissible (non-Ex versions only).

Sound pressure level

The sound pressure level of the pump is lower than the limiting values stated in the EC Machinery Directive (2006/42/EC).

Motor range

Output power [kW]	Number of poles
0.9	2
1.2	2
1.5	2
2.6	2
3.1	2
4.0	2

Frequency converter operation

In principle, all three-phase pumps can be connected to a frequency converter.

However, frequency converter operation will often expose the motor insulation system to a heavier load and cause the motor to be more noisy than usual due to eddy currents caused by voltage peaks.

In addition, large motors driven via a frequency converter will be loaded by bearing currents.

Frequency converter operation will also influence the efficiency of the grinder system.

To avoid the risk of sedimentation in the pipes, we recommend that you operate the speed-controlled pump within a speed range of 30-100 % and at a flow rate above 1 m/s.

For more information, see the installation and operating instructions for the relevant frequency converter on www.grundfos.com (Grundfos Product Center).

Approvals

The standard versions of SEG 60 Hz pumps have been approved by CSA, and the explosion-proof versions holds a CSA and FM type examination certificate No 3053414 (USA), 3053414C (Canada).

Approval standards

CSA approval according to UL778 and C22.2 No. 108, No. 0.4, No. 30, No. 145 and No. 60529.

FM approval according to FM 3600, FM 3615 and FM 3650 and ANSI/IEC 60529.

Ex approval

SEG 60 Hz pumps have the following explosion protection classification: Class I, Division 1, Groups C and D hazardous locations, T4/T3C, IP68.

Standards	Code	Description
FM 3600 FM 3615 FM 3650 ANSI/IEC 60529	Class I	Explosive atmosphere is caused by gas or vapours (permitted class)
	Division 1	Area classification (permitted division)
	Group C and D	Classification of gases
	T4/T3C	Maximum surface temperature is 135°C/160 °C.
	IP68	Enclosure class according to IEC 60529.

Wiring diagrams

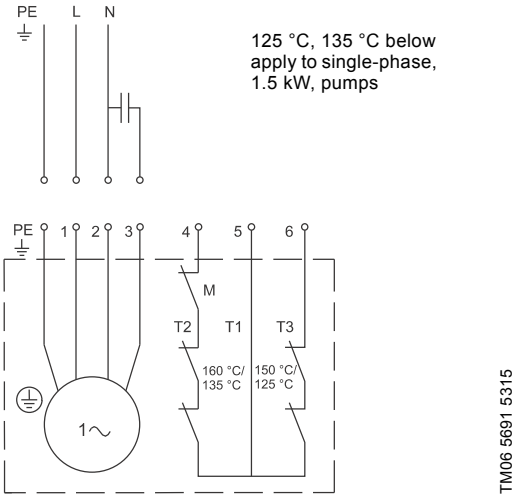


Fig. 12 Wiring diagram for single-phase SEG pumps. See table below.

Pump type	Cs, starting capacitor		Cr, run capacitor	
	[µF]	[V]	[µF]	[V]
SEG	150	230	30	450
SEG 1.5 kW (single phase)	150	230	40	450

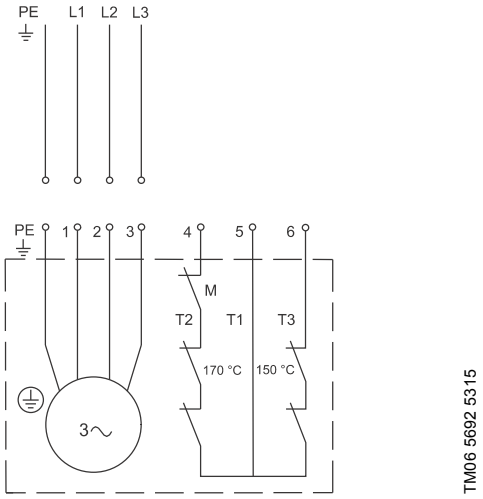
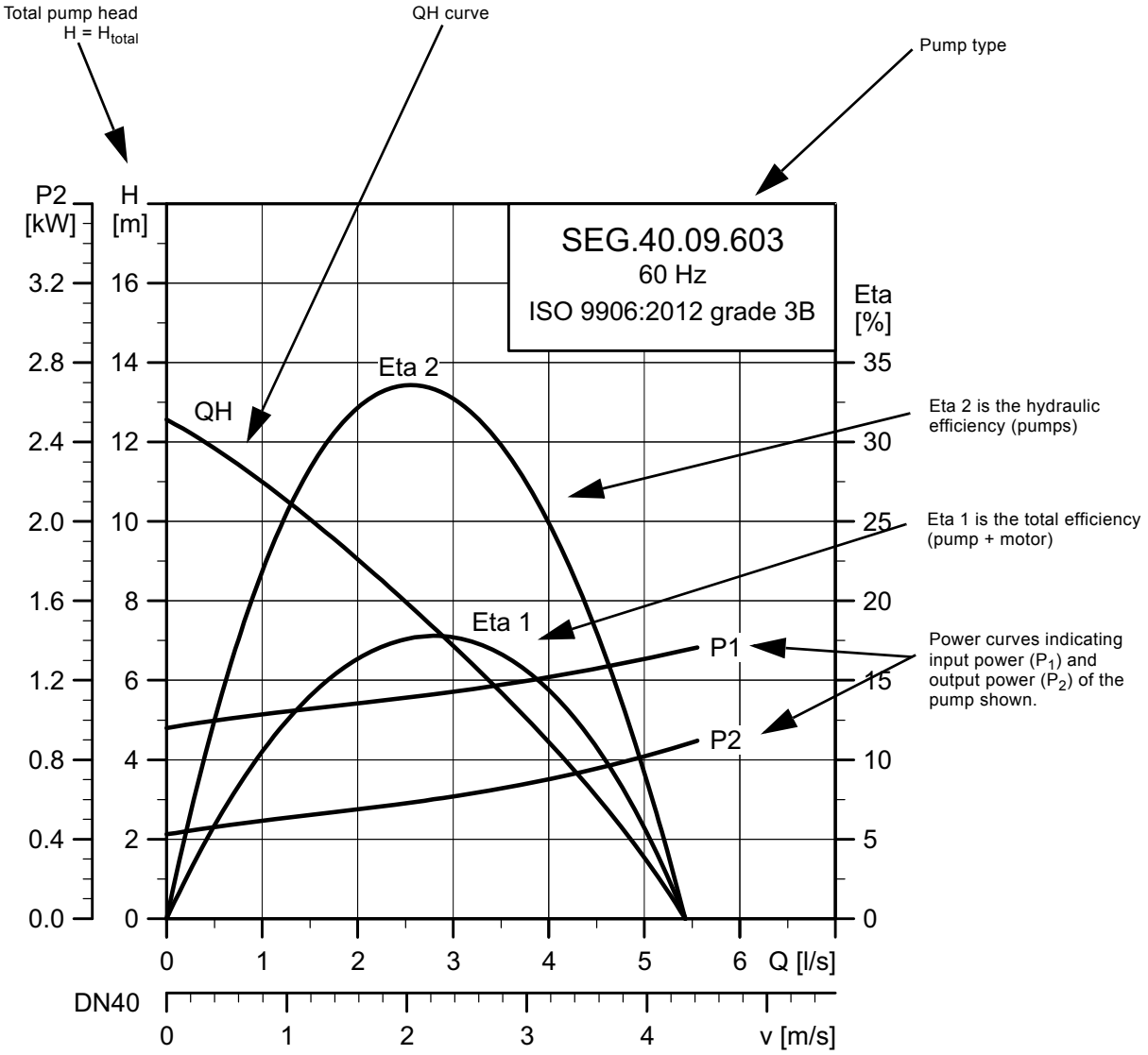


Fig. 13 Wiring diagram for three-phase SEG pumps

9. Curve charts

How to read the performance curves

The curves on the following pages apply to SEG pumps as well as the explosion-proof versions.



Note: The pumps are tested according to ISO 9906:2012 grade 3B tolerance. Testing equipment and measuring instruments are designed and calibrated according to the standards mentioned. The pumps are approved according to tolerances for entire curves, specified in grade 3B.

Curve conditions

The guidelines below apply to the curves on pages 24 to 32.

- Tolerances according to ISO 9906:2012, grade 3B.
- The curves show the pump performance with different impeller diameters at the rated speed.
- The curves apply to the pumping of airless water at a temperature of 20 °C and a kinematic viscosity of 1 mm^2/s (1 cSt).
- The Eta curves show the efficiency of the pump for the different impeller diameters.
- The NPSH curves show average values measured under the same conditions as the performance curves.
  When sizing the pump, add a safety margin of at least 0.5 m.
- In the case of other densities than 1000 kg/m^3, the outlet pressure is proportional to the density.
- When pumping liquids with a density higher than 1000 kg/m^3, motors with correspondingly higher outputs must be used.

Calculation of total head

The total pump head consists of the height difference between the measuring points + the differential head + the dynamic head.

$H_{total} = H_{geo} + H_{stat} + H_{dyn}$

H_{geo}: Height difference between measuring points.
H_{stat}: Differential head across the pump.
H_{dyn}: Calculated values based on the velocity of the pumped liquid on the inlet and outlet sides of the pump.

Performance tests

The requested duty point of every pump is tested according to ISO 9906:2012, grade 3B, and without certification.

In the case of pumps ordered on the basis of impeller diameter only (no requested duty point), the pump will be tested at a duty point which is 2/3 of the maximum flow rate of the published performance curve which is related to the ordered impeller diameter (according to ISO 9906:2012, grade 3B).

If the customer requires either more points on the curve to be checked or certain minimum performances or certificates, individual measurements must be made, and a certificate can be ordered.

Certificates

Certificates have to be confirmed for every order and are available on request. See section *List of variants* on page 13.

Witness test

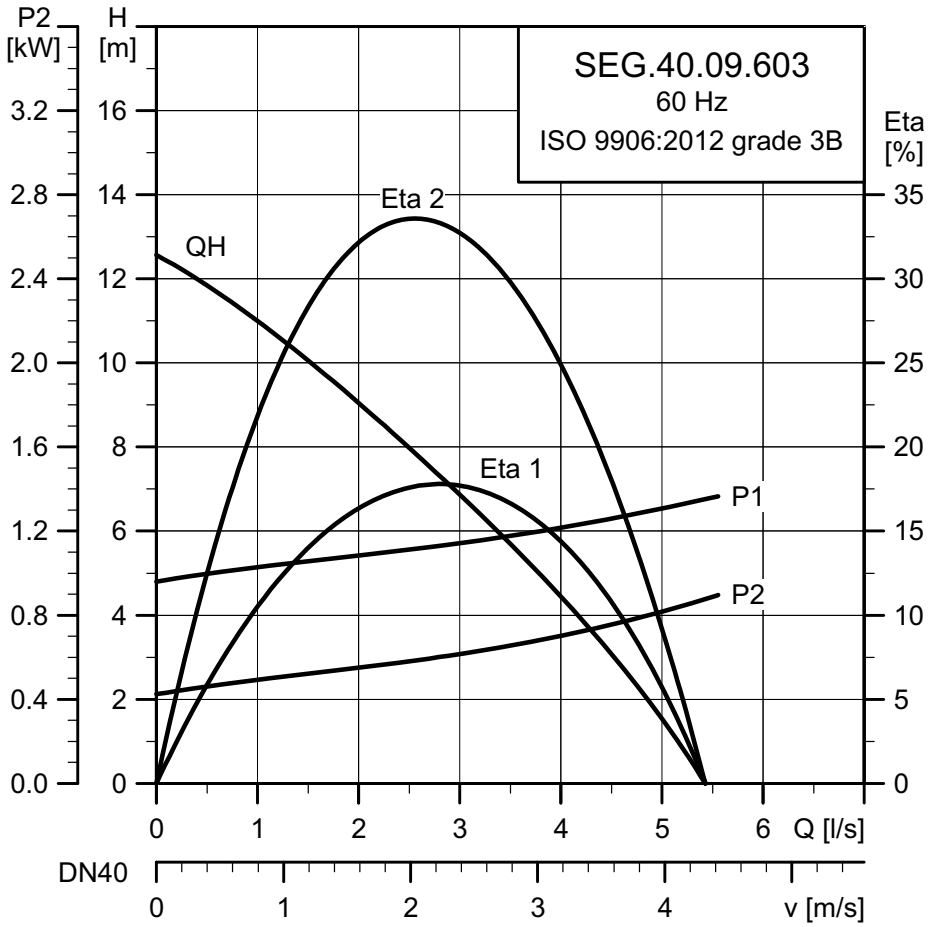
It is possible for the customer to witness the testing procedure according to ISO 9906:2012.

The witness test is not a certificate and will not result in a written statement from Grundfos. The witness test itself is the only guarantee that everything is carried out as prescribed in the testing procedure.

If the customer wants to witness the test of the pump performance, this request must be stated on the order.

10. Performance curves and technical data

SEG.(K)40.09.(Ex).2.1.603



TM05 8027 1813

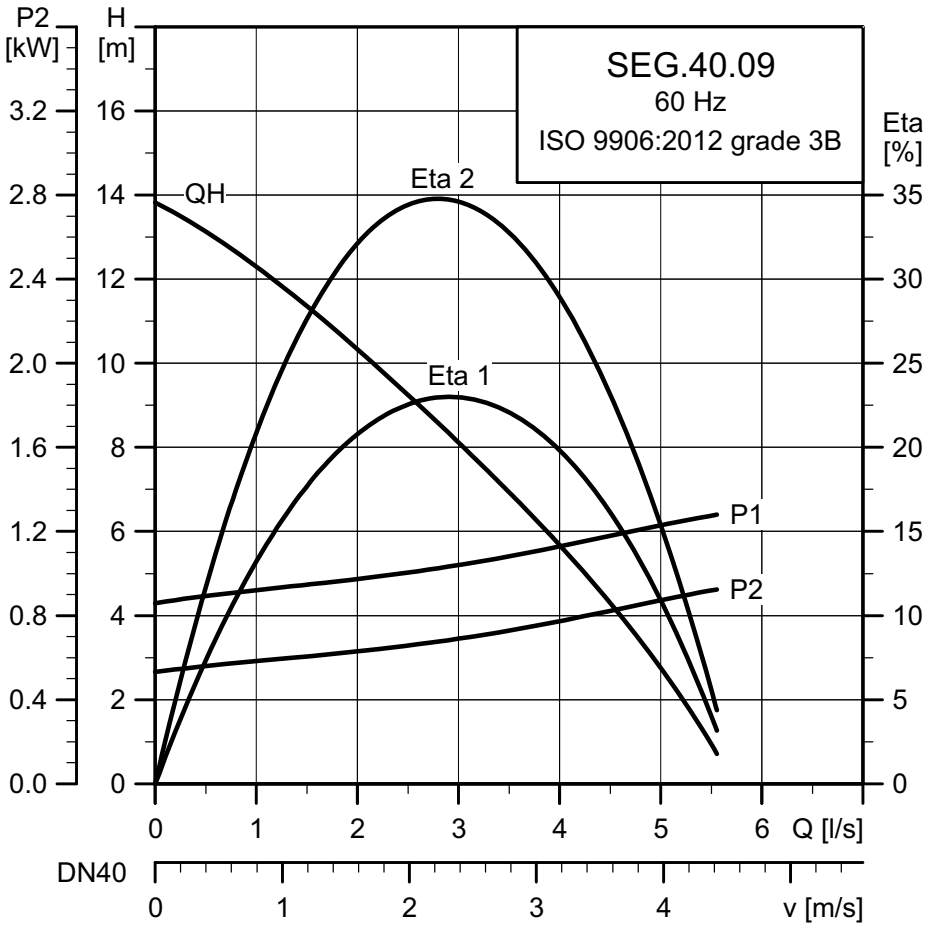
Electrical data

Voltage	P1	P2	Number of poles	min^{-1}	Starting method	I_N	I_{start}	η_{motor} [%]			Cos φ			Moment of inertia	Breakdown torque $M_{max.}$
[V]	[kW]	[kW]				[A]	[A]	1/2	3/4	1/1	1/2	3/4	1/1	[kgm^2]	[Nm]
1 x 230	1.3	0.9	2	3490	DOL	7	48	0.59	0.68	0.69	0.77	0.80	0.87	0.0007	8.2

Pump data

Impeller type	Max. solids size	Max. number of starts per hour	Max. installation depth	Enclosure class	Insulation class	Max. liquid temperature	pH	Ex class
	[mm]		[m]			[°C]		
Semi-open	Grinder system	30	10	IP68	F	40	4-10	Class 1, Division 1, Group C and D, T4 / T3, IP68

SEG.(K)40.09.(Ex).2.60G/H/M



TM05 8018 1813

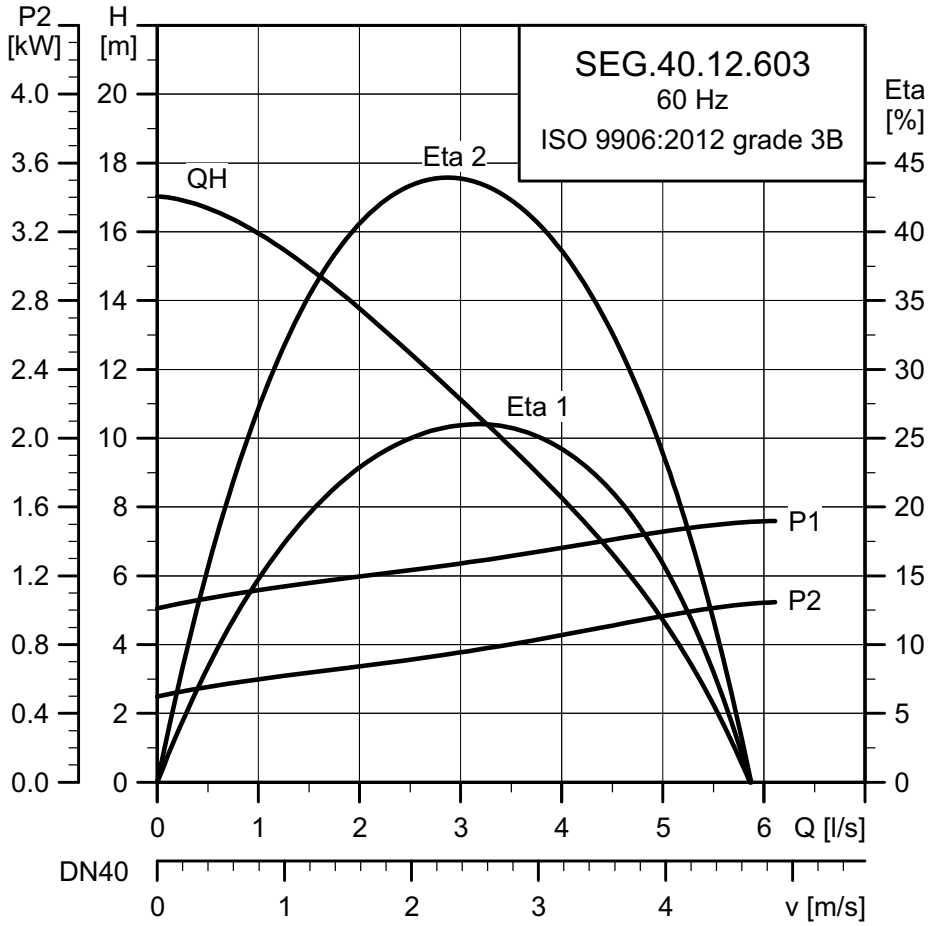
Electrical data

Voltage	P1	P2	Number of poles	min^{-1}	Starting method	I_N	I_{start}	η_{motor} [%]			Cos φ			Moment of inertia	Breakdown torque $M_{max.}$
[V]	[kW]	[kW]				[A]	[A]	1/2	3/4	1/1	1/2	3/4	1/1	[kgm^2]	[Nm]
3 x 380	1.2	0.9	2	3490	DOL	3.0	22	0.63	0.7	0.74	0.46	0.57	0.67	0.0020	15.0
3 x 460	1.2	0.9	2	3490	DOL	3.0	20	0.61	0.67	0.74	0.42	0.52	0.61	0.0020	15.0
3 x 200-230	1.2	0.9	2	3497	DOL	6.0	40	0.61	0.67	0.73	0.42	0.52	0.61	0.0020	16.4

Pump data

Impeller type	Max. solids size	Max. number of starts per hour	Max. installation depth	Enclosure class	Insulation class	Max. liquid temperature	pH	Ex class
	[mm]		[m]			[°C]		
Semi-open	Grinder system	30	10	IP68	F	40	4-10	Class 1, Division 1, Group C and D, T4 / T3, IP68

SEG.(K)40.12.(Ex).2.1.603



TM05 8028 1813

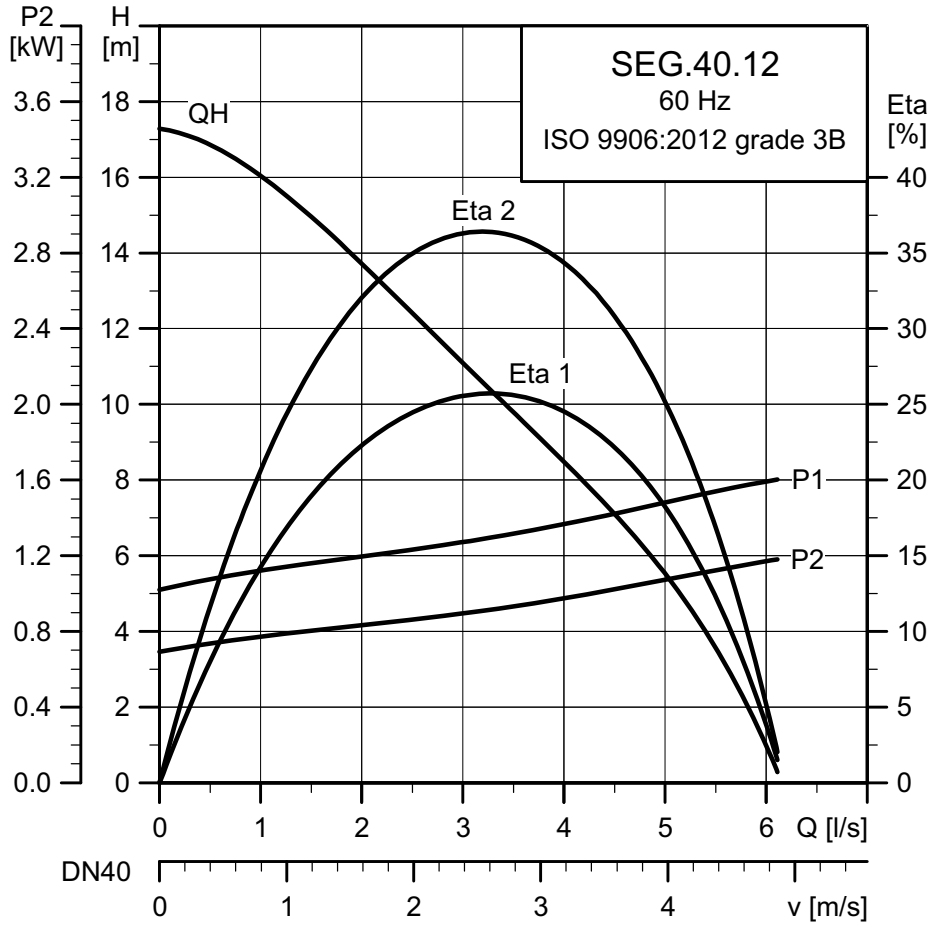
Electrical data

Voltage	P1	P2	Number of poles	min^{-1}	Starting method	I_N	I_{start}	η_{motor} [%]			Cos φ			Moment of inertia	Breakdown torque $M_{max.}$
[V]	[kW]	[kW]				[A]	[A]	1/2	3/4	1/1	1/2	3/4	1/1	[kgm^2]	[Nm]
1 x 230	1.6	1.2	2	3450	DOL	8.0	48	0.66	0.73	0.74	0.80	0.82	0.91	0.0007	8.2

Pump data

Impeller type	Max. solids size	Max. number of starts per hour	Max. installation depth	Enclosure class	Insulation class	Max. liquid temperature	pH	Ex class
	[mm]		[m]			[°C]		
Semi-open	Grinder system	30	10	IP68	F	40	4-10	Class 1, Division 1, Group C and D, T4 / T3, IP68

SEG.(K)40.12.(Ex).2.60G/H/M



TM05 8019 1813

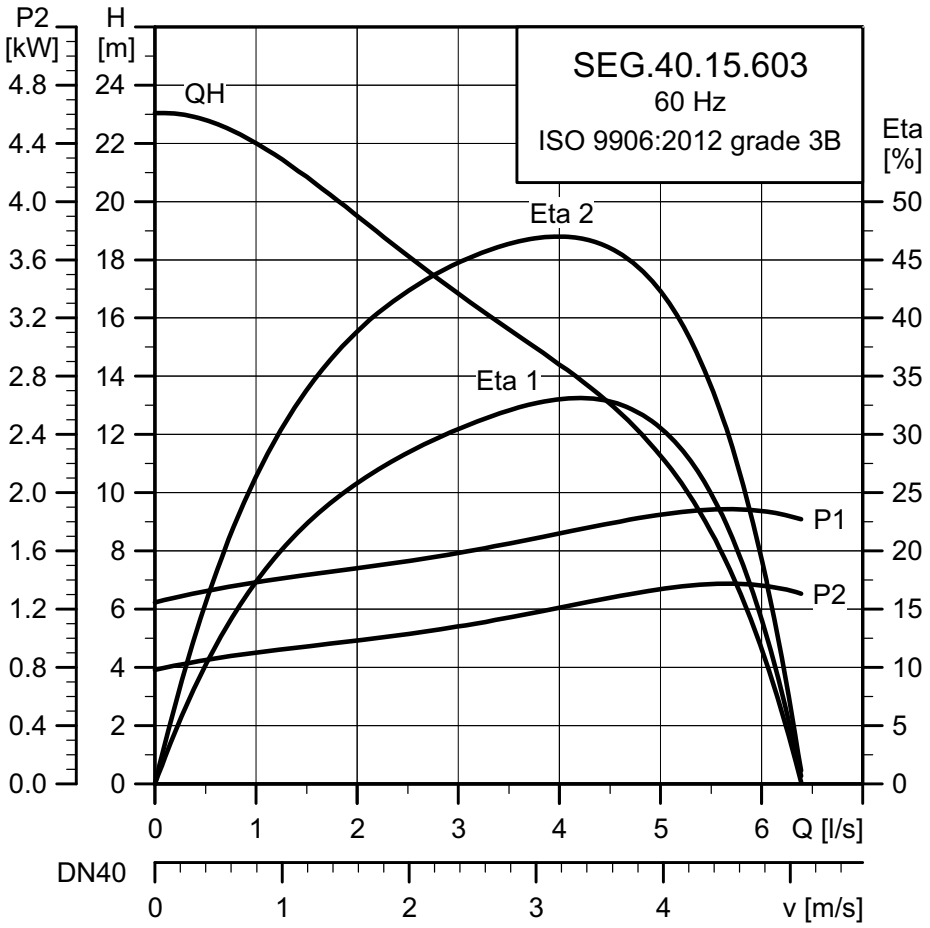
Electrical data

Voltage	P1	P2	Number of poles	min^{-1}	Starting method	I_N	I_{start}	η_{motor} [%]			Cos φ			Moment of inertia	Breakdown torque $M_{max.}$
[V]	[kW]	[kW]				[A]	[A]	1/2	3/4	1/1	1/2	3/4	1/1	[kgm^2]	[Nm]
3 x 380	1.5	1.2	2	3450	DOL	4.0	22	0.68	0.74	0.78	0.54	0.67	0.77	0.0020	15.0
3 x 460	1.5	1.2	2	3450	DOL	3.0	20	0.65	0.73	0.78	0.48	0.61	0.72	0.0020	15.0
3 x 200-230	1.6	1.2	2	3460	DOL	6.0	40	0.65	0.73	0.77	0.48	0.61	0.72	0.0020	16.4

Pump data

Impeller type	Max. solids size	Max. number of starts per hour	Max. installation depth	Enclosure class	Insulation class	Max. liquid temperature	pH	Ex class
	[mm]		[m]			[°C]		
Semi-open	Grinder system	30	10	IP68	F	40	4-10	Class 1, Division 1, Group C and D, T4 / T3, IP68

SEG.(K)40.15.(Ex).2.1.603



TM05 8029 1813

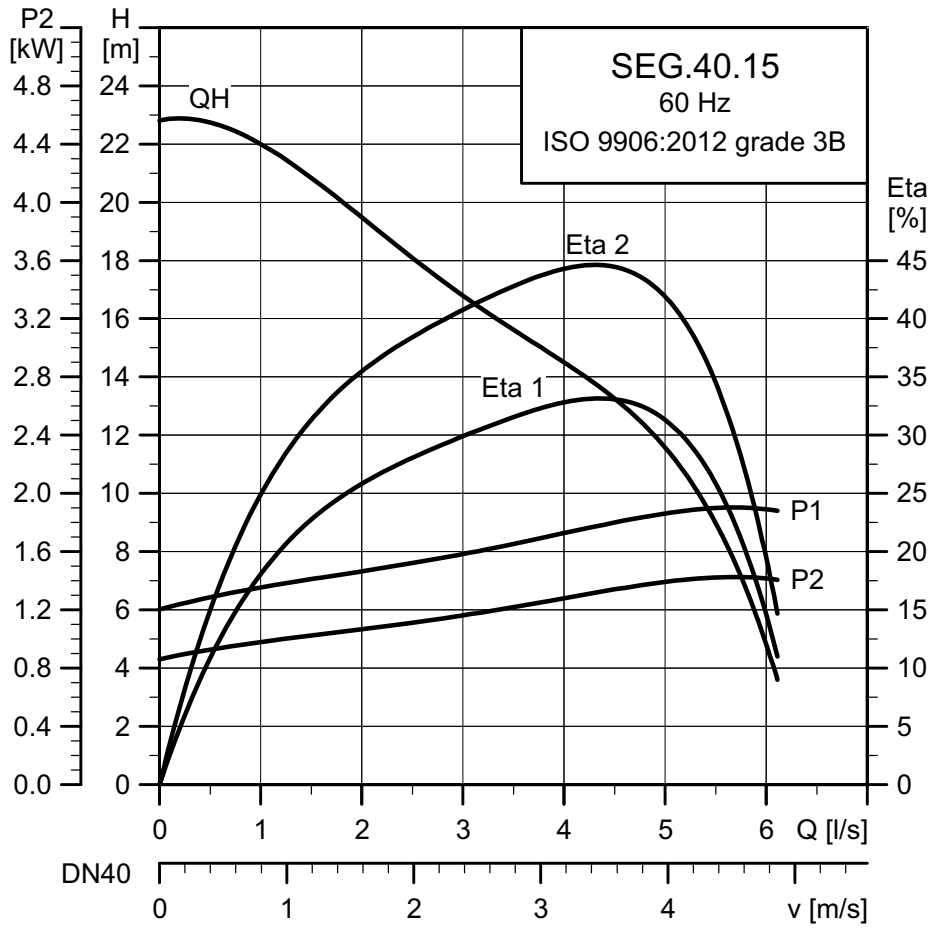
Electrical data

Voltage	P1	P2	Number of poles	min^{-1}	Starting method	I_N	I_{start}	η_{motor} [%]			Cos φ			Moment of inertia	Breakdown torque $M_{max.}$
[V]	[kW]	[kW]				[A]	[A]	1/2	3/4	1/1	1/2	3/4	1/1	[kgm^2]	[Nm]
1 x 230	2.1	1.5	2	3400	DOL	11	48	0.60	0.70	0.71	0.26	0.54	0.88	0.0008	8.2

Pump data

Impeller type	Max. solids size	Max. number of starts per hour	Max. installation depth	Enclosure class	Insulation class	Max. liquid temperature	pH	Ex class
	[mm]		[m]			[°C]		
Semi-open	Grinder system	30	10	IP68	F	40	4-10	Class 1, Division 1, Group C and D, T4 / T3, IP68

SEG.(K)40.15.(Ex).2.60G/H/M



TM05 8020 1813

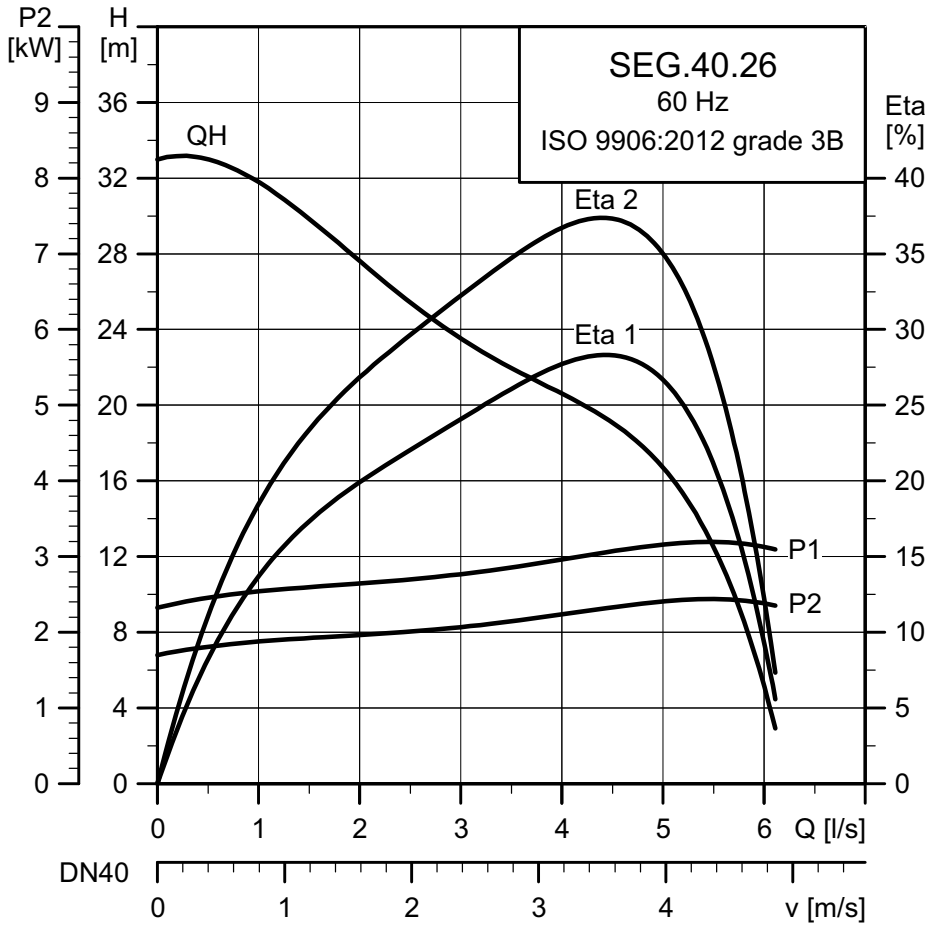
Electrical data

Voltage	P1	P2	Number of poles	min^{-1}	Starting method	I_N	I_{start}	η_{motor} [%]			Cos φ			Moment of inertia	Breakdown torque $M_{max.}$
[V]	[kW]	[kW]				[A]	[A]	1/2	3/4	1/1	1/2	3/4	1/1	[kgm^2]	[Nm]
3 x 380	1.9	1.5	2	3405	DOL	4.0	22	0.72	0.77	0.78	0.61	0.75	0.84	0.0020	15.0
3 x 380	1.9	1.5	2	3405	DOL	4.0	20	0.70	0.76	0.78	0.70	0.75	0.80	0.0020	15.0
3 x 200-230	1.9	1.5	2	3422	DOL	7.0	40	0.69	0.76	0.78	0.55	0.69	0.79	0.0020	16.4

Pump data

Impeller type	Max. solids size	Max. number of starts per hour	Max. installation depth	Enclosure class	Insulation class	Max. liquid temperature	pH	Ex class
	[mm]		[m]			[°C]		
Semi-open	Grinder system	30	10	IP68	F	40	4-10	Class 1, Division 1, Group C and D, T4 / T3, IP68

SEG.(K)40.26.(Ex).2.60G/H/M



TM05 8021 1813

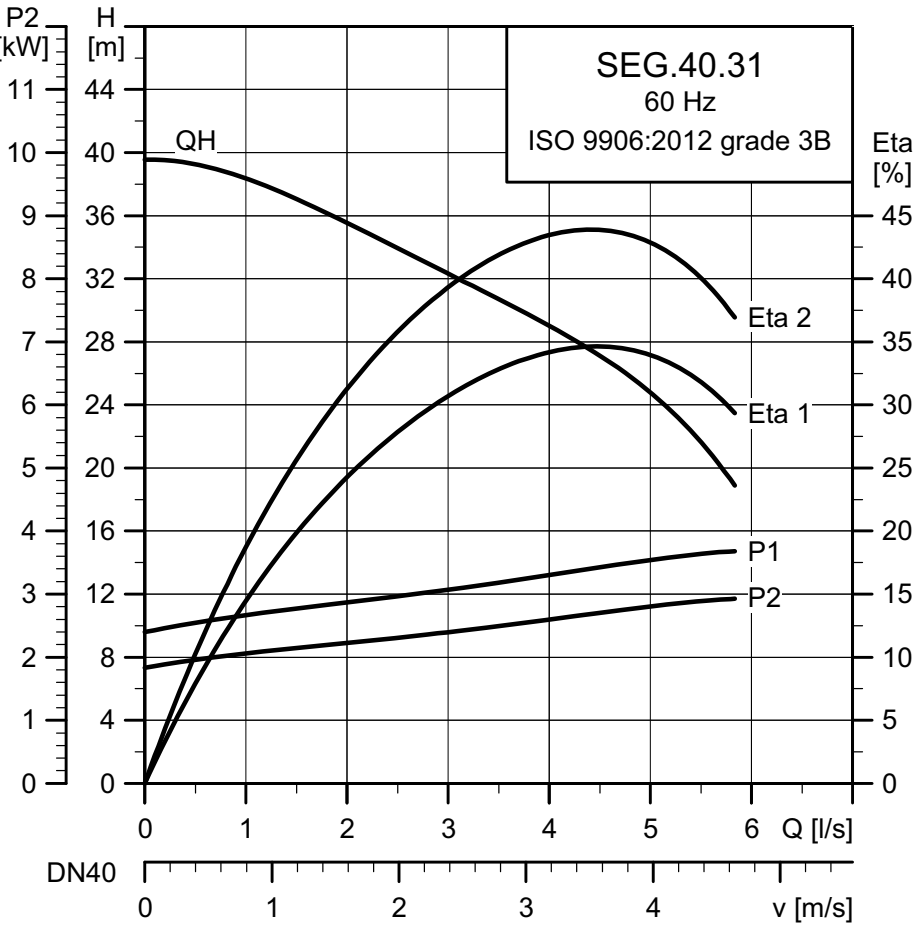
Electrical data

Voltage	P1	P2	Number of poles	min^{-1}	Starting method	I_N	I_{start}	η_{motor} [%]			Cos φ			Moment of inertia	Breakdown torque $M_{max.}$
[V]	[kW]	[kW]				[A]	[A]	1/2	3/4	1/1	1/2	3/4	1/1	[kgm^2]	[Nm]
3 x 380	3.4	2.6	2	3455	DOL	6.0	39	0.72	0.75	0.76	0.759	0.834	0.875	0.0160	18.2
3 x 460	3.4	2.6	2	3475	DOL	5.0	34	0.70	0.74	0.76	0.88	0.88	0.90	0.0160	18.2
3 x 200-230	3.4	2.6	2	3475	DOL	11.0	65	0.69	0.74	0.76	0.70	0.79	0.847	0.0160	18.2

Pump data

Impeller type	Max. solids size	Max. number of starts per hour	Max. installation depth	Enclosure class	Insulation class	Max. liquid temperature	pH	Ex class
	[mm]		[m]			[°C]		
Semi-open	Grinder system	30	10	IP68	F	40	4-10	Class 1, Division 1, Group C and D, T4 / T3, IP68

SEG.(K)40.31.(Ex).2.60G/H/M



TM05 8022 1813

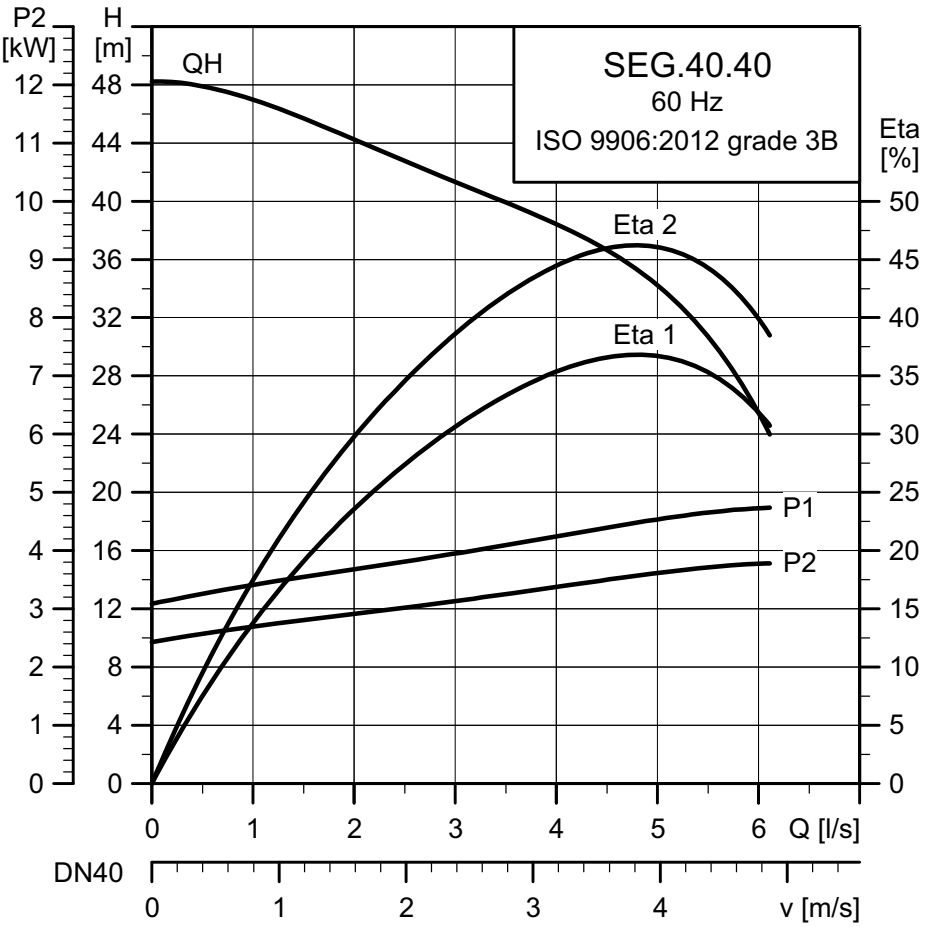
Electrical data

Voltage	P1	P2	Number of poles	min^{-1}	Starting method	I_N	I_{start}	η_{motor} [%]			Cos φ			Moment of inertia	Breakdown torque $M_{max.}$
[V]	[kW]	[kW]				[A]	[A]	1/2	3/4	1/1	1/2	3/4	1/1	[kgm^2]	[Nm]
3 x 380	4.0	3.1	2	3482	DOL	7.0	49.6	0.72	0.76	0.78	0.77	0.85	0.88	0.0258	22.3
3 x 460	3.9	3.1	2	3490	DOL	6.0	43.0	0.75	0.78	0.80	0.75	0.83	0.88	0.0258	22.3
3 x 200-230	3.9	3.1	2	3498	DOL	12.0	89.5	0.72	0.77	0.80	0.70	0.80	0.85	0.0258	24.4

Pump data

Impeller type	Max. solids size	Max. number of starts per hour	Max. installation depth	Enclosure class	Insulation class	Max. liquid temperature	pH	Ex class
	[mm]		[m]			[°C]		
Semi-open	Grinder system	30	10	IP68	F	40	4-10	Class 1, Division 1, Group C and D, T4 / T3, IP68

SEG.(K)40.40.(Ex).2.60G/H/M



TM05 8023 1813

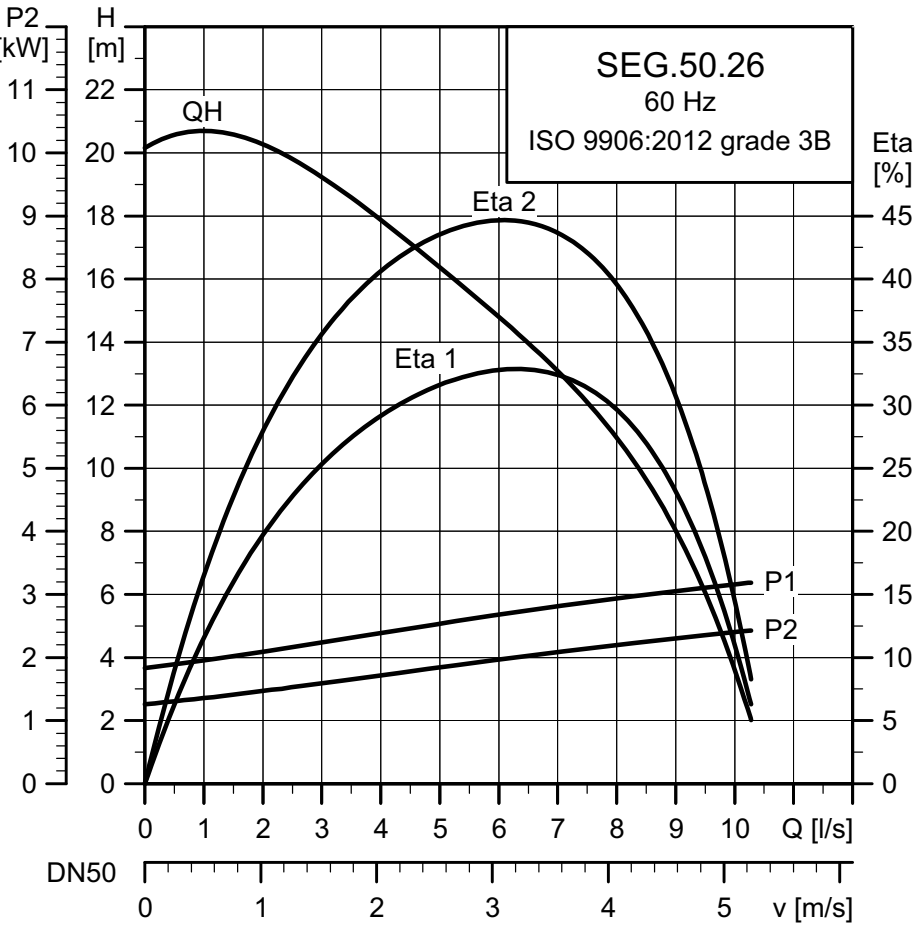
Electrical data

Voltage	P1	P2	Number of poles	min^{-1}	Starting method	I_N	I_{start}	η_{motor} [%]			Cos φ			Moment of inertia	Breakdown torque $M_{max.}$
[V]	[kW]	[kW]				[A]	[A]	1/2	3/4	1/1	1/2	3/4	1/1	[kgm^2]	[Nm]
3 x 380	5.1	4.0	2	3440	DOL	9.0	49.6	0.75	0.78	0.78	0.82	0.88	0.89	0.0262	22.3
3 x 460	5.1	4.0	2	3452	DOL	8.0	43.0	0.77	0.80	0.79	0.80	0.88	0.90	0.0262	22.3
3 x 200-230	5.0	4.0	2	3463	DOL	14.0	89.5	0.76	0.80	0.80	0.66	0.79	0.91	0.0262	22.4

Pump data

Impeller type	Max. solids size	Max. number of starts per hour	Max. installation depth	Enclosure class	Insulation class	Max. liquid temperature	pH	Ex class
	[mm]		[m]			[°C]		
Semi-open	Grinder system	30	10	IP68	F	40	4-10	Class 1, Division 1, Group C and D, T4 / T3, IP68

SEG.(K)50.26.(Ex).2.60G/M



TM05 8024 1214

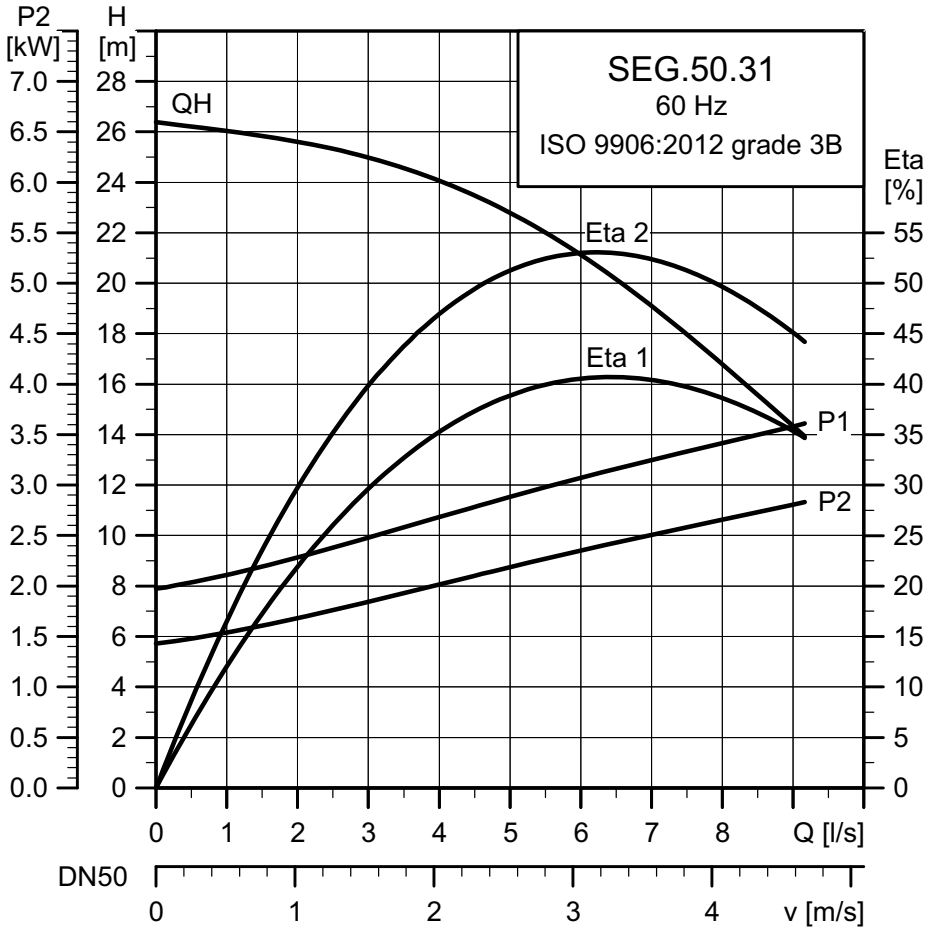
Electrical data

Voltage	P1	P2	Number of poles	min^{-1}	Starting method	I_N	I_{start}	η_{motor} [%]			Cos φ			Moment of inertia	Breakdown torque $M_{max.}$
[V]	[kW]	[kW]				[A]	[A]	1/2	3/4	1/1	1/2	3/4	1/1	[kg·m²]	[Nm]
3 x 380	3.4	2.6	2	3455	DOL	6.0	39	0.72	0.75	0.76	0.759	0.834	0.875	0.0160	18.2
3 x 200-230	3.4	2.6	2	3475	DOL	11.0	65	0.69	0.74	0.76	0.70	0.79	0.847	0.0160	18.2

Pump data

Impeller type	Max. solids size	Max. number of starts per hour	Max. installation depth	Enclosure class	Insulation class	Max. liquid temperature	pH
	[mm]		[m]			[°C]	
Semi-open	Grinder system	30	10	IP68	F	40	4-10

SEG.(K)50.31.(Ex).2.60G/H/M



TM05 8025 1214

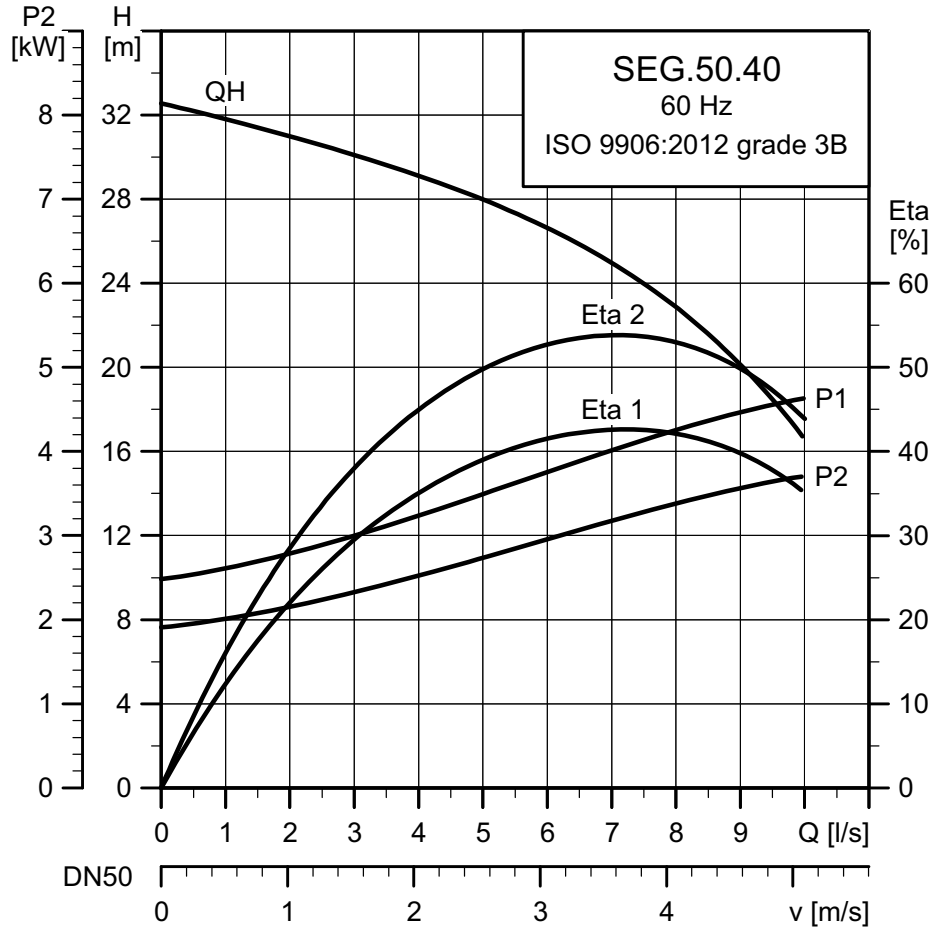
Electrical data

Voltage	P1	P2	Number of poles	min^{-1}	Starting method	I_N	I_{start}	η_{motor} [%]			Cos φ			Moment of inertia	Breakdown torque $M_{max.}$
[V]	[kW]	[kW]				[A]	[A]	1/2	3/4	1/1	1/2	3/4	1/1	[kg·m^2]	[Nm]
3 x 380	4.0	3.1	2	3482	DOL	7.0	49.6	0.72	0.76	0.78	0.77	0.85	0.88	0.0258	22.3
3 x 460	3.9	3.1	2	3490	DOL	6.0	43.0	0.75	0.78	0.80	0.75	0.83	0.88	0.0258	22.3
3 x 200-230	3.9	3.1	2	3498	DOL	12.0	89.5	0.72	0.77	0.80	0.70	0.80	0.85	0.0258	24.4

Pump data

Impeller type	Max. solids size	Max. number of starts per hour	Max. installation depth	Enclosure class	Insulation class	Max. liquid temperature	pH
	[mm]		[m]			[°C]	
Semi-open	Grinder system	30	10	IP68	F	40	4-10

SEG.(K)50.40.(Ex).2.60G/H/M



TM05 8026 1214

Electrical data

Voltage	P1	P2	Number of poles	min^{-1}	Starting method	I_N	I_{start}	η_{motor} [%]			Cos φ			Moment of inertia	Breakdown torque $M_{max.}$
[V]	[kW]	[kW]				[A]	[A]	1/2	3/4	1/1	1/2	3/4	1/1	[kg·m^2]	[Nm]
3 x 380	5.1	4.0	2	3440	DOL	9.0	49.6	0.75	0.78	0.78	0.82	0.88	0.89	0.0262	22.3
3 x 460	5.1	4.0	2	3452	DOL	8.0	43.0	0.77	0.80	0.79	0.80	0.88	0.90	0.0262	22.3
3 x 200-230	5.0	4.0	2	3463	DOL	14.0	89.5	0.76	0.80	0.80	0.66	0.79	0.91	0.0262	22.4

Pump data

Impeller type	Max. solids size	Max. number of starts per hour	Max. installation depth	Enclosure class	Insulation class	Max. liquid temperature	pH
	[mm]		[m]			[°C]	
Semi-open	Grinder system	30	10	IP68	F	40	4-10

11. Dimensions and weights

Dimensions

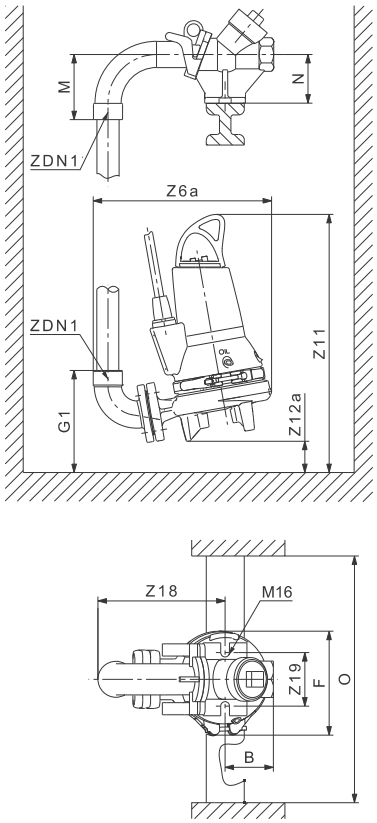


Fig. 14 Installation on hookup auto-coupling

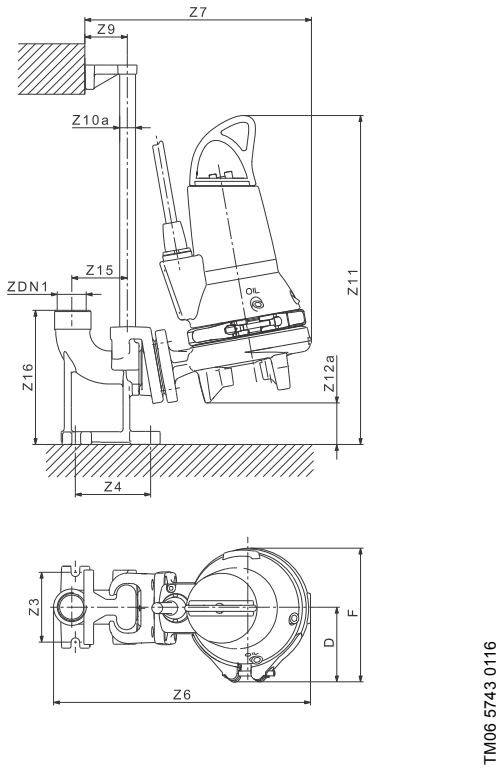


Fig. 15 Installation on auto-coupling

	Power [kW]	A	B	D	F	G1	M	N	O	Z4	Z6
SEG.(K)40	0.9 and 1.2	467	100	99	216	214	134	100	min. 600	118	421
	1.5 (1-phase)	482	100	99	216	214	134	100		118	421
	1.5 (3-phase)	467	100	99	216	214	134	100		118	421
	2.6	521	100	119	256	215	134	100		118	462
	3.1 and 4.0	561	100	119	256	215	134	100		118	462

	Power [kW]	Z6a	Z7	Z9	Z10a	Z11	Z12a	Z15	Z16	Z18	Z19	ZDN1
SEG.(K)40	0.9 and 1.2	362	371	70	3/4" - 1"	546	66	90	221	271	120	NPT 2
	1.5 (1-phase)	362	371	70	3/4" - 1"	561	66	90	221	271	120	NPT 2
	1.5 (3-phase)	362	371	70	3/4" - 1"	546	66	90	221	271	120	NPT 2
	2.6	367	412	70	3/4" - 1"	614	80	90	221	271	120	NPT 2
	3.1 and 4.0	367	412	70	3/4" - 1"	651	80	90	221	271	120	NPT 2

	Power [kW]	A	B	D	F	G1	M	N	O	Z4	Z6
SEG.(K)50	2.6	532	100	119	173	225	134	100	min. 600	118	461
	3.1 and 4.0	572	100	119	173	225	134	100		118	461

	Power [kW]	Z6a	Z7	Z9	Z10a	Z11	Z12a	Z15	Z16	Z18	Z19	ZDN1
SEG.(K)50	2.6	366	411	70	3/4" - 1"	625	80	90	221	271	120	NPT 2
	3.1 and 4.0	366	411	70	3/4" - 1"	662	80	90	221	271	120	NPT 2

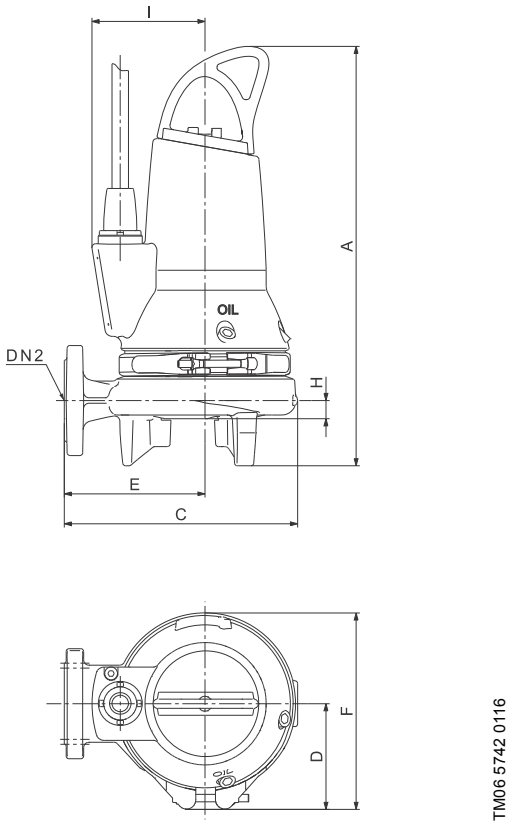


Fig. 16 Free-standing installation

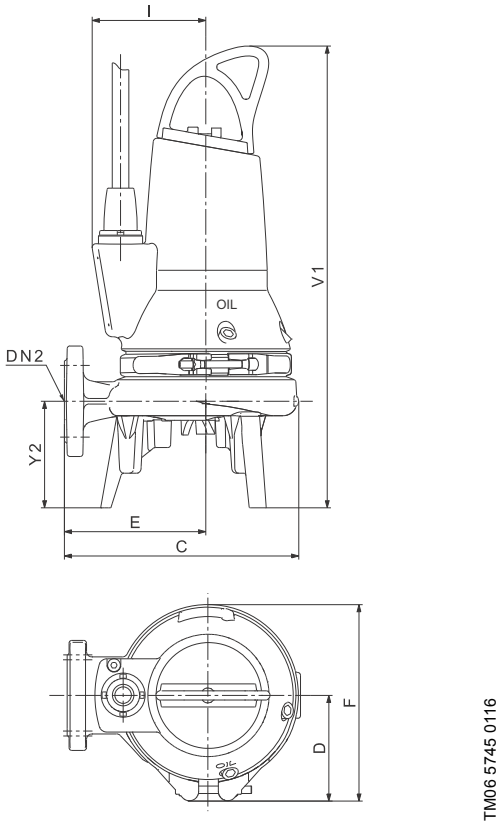


Fig. 17 Free-standing installation with foot extensions

	Power [kW]	A	C	D	DN2	E	F	H	I	V1	Y2
SEG.(K)40	0.9 and 1.2	467	252	99	DN 40	154	216	73	123	510	116
	1.5 (1-phase)	482	252	99	DN 40	154	216	73	123	525	116
	1.5 (3-phase)	467	252	99	DN 40	154	216	73	123	510	116
	2.6	521	294	119	DN 40	173	256	60	143	577	115
	3.1 and 4.0	561	294	119	DN 40	173	256	60	143	617	115

	Power [kW]	A	C	D	DN2	E	F	H	I	V1	Y2
SEG.(K)50	2.6	532	293	119	DN 50	173	256	60	143	577	115
	3.1 and 4.0	572	293	119	DN 50	173	256	60	143	627	115

Weights

Pumps - DN 40 outlet flange	Weight [kg]
SEG.40.09.(EX).2.1.603	48.0
SEG.40.09.(EX).2.60G/H/M	46.0
SEG.40.12.(EX).2.1.603	48.0
SEG.40.12.(EX).2.60G/H/M	46.0
SEG.40.15.(EX).2.1.603	50.0
SEG.40.15.(EX)2.60G/H/M	48.0
SEG.40.26...	70.0
SEG.40.31...	81.0
SEG.40.40...	81.0

Pumps - DN 50 outlet flange	Weight [kg]
SEG.50.26...	70.0
SEG.50.31...	81.0
SEG.50.40...	81.0

Pumps - K40 outlet flange (USA and Canada)	Weight [kg]
SEG.K40.09...	46.0
SEG.K40.12...	46.0
SEG.K40.15...	48.0
SEG.K40.26...	70.0
SEG.K40.31...	81.0
SEG.K40.40...	81.0
SEG.K40.50...	48.0

Pumps - K50 outlet flange (USA and Canada)	Weight [kg]
SEG.K50.26...	70.0
SEG.K50.31...	81.0
SEG.K50.40...	81.0

12. Accessories

Installation systems

Product		Description	Dimensions	Product number	SEG.40 standard	SEG.50 standard	SEG.40 Ex	SEG.50 Ex
	TM01 7173 1409	Lifting chain with shackle. With certificates Stainless steel (EN 1.4571/A4) Up to 500 kg	2 m	98538174	•	•	•	•
			3 m	98538175	•	•	•	•
			4 m	98538176	•	•	•	•
			6 m	98538177	•	•	•	•
			8 m	98538178	•	•	•	•
			10 m	98538179	•	•	•	•
		Lifting chain with shackle. With certificates Galvanized steel Up to 800 kg	2 m	98425759	•	•	•	•
			4 m	98425760	•	•	•	•
			6 m	98425781	•	•	•	•
			8 m	98425782	•	•	•	•
			10 m	98425783	•	•	•	•
		Lifting chain with shackle. With certificates Stainless steel (EN 1.4571/A4) Up to 800 kg	2 m	98425796	•	•	•	•
			4 m	98425797	•	•	•	•
			6 m	98425798	•	•	•	•
			8 m	98425799	•	•	•	•
			10 m	98425800	•	•	•	•
	TM02 5980 4602	Auto-coupling system complete, i.e. upper guide rail holder, bolts, nuts, gaskets, guide claw and base stand. Cast iron. **Note:** In installations with guide rails longer than 4 metres, we recommend that you use intermediate guide rail bracket.	DN 40/Rp 1 1/2	96076063	•		•	
			JIS/KS DN 40	98245789				
			DN 50 pit / PS	97695874		•		•
			JIS/KS DN 50 pit / PS	98245794		•		•
	TM02 5979 4602	Hookup auto-coupling, i.e. base stand, counterpart, bolts, nuts and gaskets. Cast iron.	DN 40/Rp 1 1/2	96076089	•		•	
		Hookup auto-coupling with extended bend, i.e. base stand, counter part, bolts, nuts and gaskets. Cast iron.	DN 40/Rp 1 1/2	97713859	•		•	
	TM03 0716 0505	Three loose feet to be fitted to the pump housing of free-standing pumps.	-	96076196	•	•	•	•
	TM05 7683 1513	Intermediate guide rail bracket (guide rails 4 meter and longer). Stainless steel.	DN 40	96887609	•	•	•	•

Controllers

Level controllers

Grundfos offers a wide range of pump controllers controlling the liquid levels in the wastewater collecting pit, ensuring correct operation and protection of the pumps.

Controller ranges:

- Dedicated Control cabinets
- LC and LCD level controllers
- CU 100 control box.

The LC and CU 100 are designed for one-pump installations, and the dedicated controls and LCD are designed for two-pump installations.

Dedicated Controls

Grundfos Dedicated Controls is a control system that can control and monitor one to six Grundfos wastewater pumps and a mixer or a flush valve.

Dedicated Controls is used in installations requiring advanced control and data communication.

Main components of the Dedicated Controls system:

- CU 362 control unit
- IO 351B module (general I/O module).

Dedicated Controls is available either as separate components or as control cabinets, i.e. dedicated controls.

The control system can be operated by the following:

- float switches
- a level sensor
- an analog pressure transmitter or ultrasonic level transmitter
- a level sensor and safety float switches.

The control cabinet is available for the following pump sizes and starting methods:

- pumps up to and including 9 kW, direct-on-line starting
- pump up to and including 30 kW, variable frequency drives
- pumps up to and including 30 kW, star-delta starting
- pumps up to and including 30 kW, soft starter.

The separate control unit and modules can be built for practically any size of system.

TM06 0918 1214

Fig. 18 Dedicated Controls control cabinet

The dedicated control cabinets can be fitted with various units:

- The CU 362 control unit, which is the "brain" of the Dedicated Controls system, is fitted in the cabinet front. The CU 362 can be fitted with one of the Grundfos CIM communication modules mentioned below, depending on the monitoring needs or the SCADA system:
  - The CIM 202 is a communication module used for the Modbus RTU fieldbus protocol.
  - The CIM 252 is a communication module used for GSM/GPRS communication. The CIM 252 establishes communication between the CU 362 and a SCADA system, thereby allowing the application to be monitored and controlled remotely. This module also offers SMS messaging, for example status and alarm messages.
  - The CIM 272 is a communication module for the Grundfos Remote Management system (GRM). The CIM 272 establishes communication between the CU 362 and the GRM, thereby allowing the application to be monitored and controlled remotely.
  - CIM 060 enables dedicated controls to work with the Grundfos GO APP.
  - CIM 150 is a communication module for PROFIBUS DP protocol.
  - CIM 500 is an Industrial Ethernet high-speed module for PROFINET and Modbus TCP communication.
- The IO 351B module, which is a general I/O module communicating with the CU 362 via GENIbus.
- IO/SM 113: pump sensor interface for WIO sensor and PT sensors.
- The MP 204 motor protector (optional), which provides many electrical status values, for example voltage, current, power, insulation resistance and energy. The MP 204 offers better protection of the pumps than a conventional motor protection device.
- The CUE/VFD (optional), which is either a Grundfos variable-frequency converter or a general variable-frequency converter, also offers better pump protection and a more steady flow through the pit pipes, so the pumps are treated well and the energy consumption is kept at a minimum.

For further information, see the data booklet or installation and operating instructions for Dedicated Controls on www.grundfos.com (Grundfos product center).

LC and LCD

The Grundfos LC and LCD ranges of level controllers comprise three series with a total of six variants:

- LC and LCD 107 operated by air bells
- LC and LCD 108 operated by float switches
- LC and LCD 110 operated by electrodes
- LC and LCD 115 operated by level transmitter.

All controllers are ideally suited for applications requiring up to 11 kW motors for direct-on-line starting. The LC and LCD can also be supplied with an integrated star-delta starter for applications requiring larger motors up to and including 30 kW.

Features and benefits

- Control of one pump (LC) or two pumps (LCD).
- Automatic alternating operation of two pumps (LCD).
- Automatic test run (prevents shaft seals from becoming jammed in the event of long periods of inactivity).
- Water hammer protection.
- Starting delay after power supply failure.
- Automatic alarm resetting, if required.
- Automatic restarting, if required.
- Alarm outputs as NO and NC.

TM04 2360 2408

Fig. 19 LCD 110 for two-pump installations

When an SMS module (optional) is fitted in an LC or LCD controller, it acts as a time recorder for the pumps, and when programmed (using an ordinary mobile phone with text messaging facility), it can send text messages containing "high-level alarm", "general alarm", information about operation and the number of times the pump has started. The SMS module is also available with battery and can thus send text messages that will inform you of power failure and when the power has been restored.

For further information, see the data booklet or installation and operating instructions for the LC and LCD controllers on www.grundfos.com (Grundfos Product Center).

CU 100

The CU 100 control box is designed for the starting, operation and protection of small wastewater pumps.

The control box is available in several variants which can be used for the following:

- single-phase pumps (up to and including 9 A)
- three-phase pumps (up to and including 5 A)

and

- start/stop by means of a float switch
- manual start/stop.

During manual operation, the pump is started and stopped with the on/off switch.

During automatic operation, the float switch will start and stop the pump.

For further information, see the installation and operating instructions for the CU 100 on www.grundfos.com (Grundfos Product Center).

TM02 6459 0703

Fig. 20 CU 100

Name		DC	LC	LCD	CU 100
Application					
	One pump	●	●	●	●
	Two pumps	●		●	
	Mixer	●			
	Battery backup	●			
Level sensor					
	Float switches	●	●	●	●
	Electrodes		●	●	
	Air bells		●	●	
	Pressure sensor	●			
	Ultrasonic sensor	●			
	Analog level sensor with safety float switches	●			
Starting method					
	Direct-on-line starting (DOL)	●	●	●	●
	Star-delta starting	●	●	●	
	Soft starter	●			
Basic functions					
	Start and stop of pump(s)	●	●	●	●
	Pump alternation			●	
	High-level alarm	●	●	●	
	Dry-running level alarm	●	●	●	
	Flow measurement (calculated or via flow sensor)	●			
	Pump statistics	●			
	Conflicting levels alarm	●			
Advanced functions					
	Start and stop delays	●	●	●	
	Motor temperature sensor	●	●	●	
	Test run/anti-seizing	●	●	●	
	Daily emptying (emptying the pit once a day)	●			
	Water-in-oil sensor input	●			
Communication					
	SMS messaging	● [2)]	● [1)]	● [1)]	
	SCADA communication (GSM/GPRS)	● [2)]			
User interface					
	Level indication	●	●	●	
	Graphic display	●			
	PC Tool WW Controls	●			

1) If an SMS module is fitted.

2) If a CIM 252 GSM/GPRS module is fitted in the CU 362.

13. Grundfos Product Center

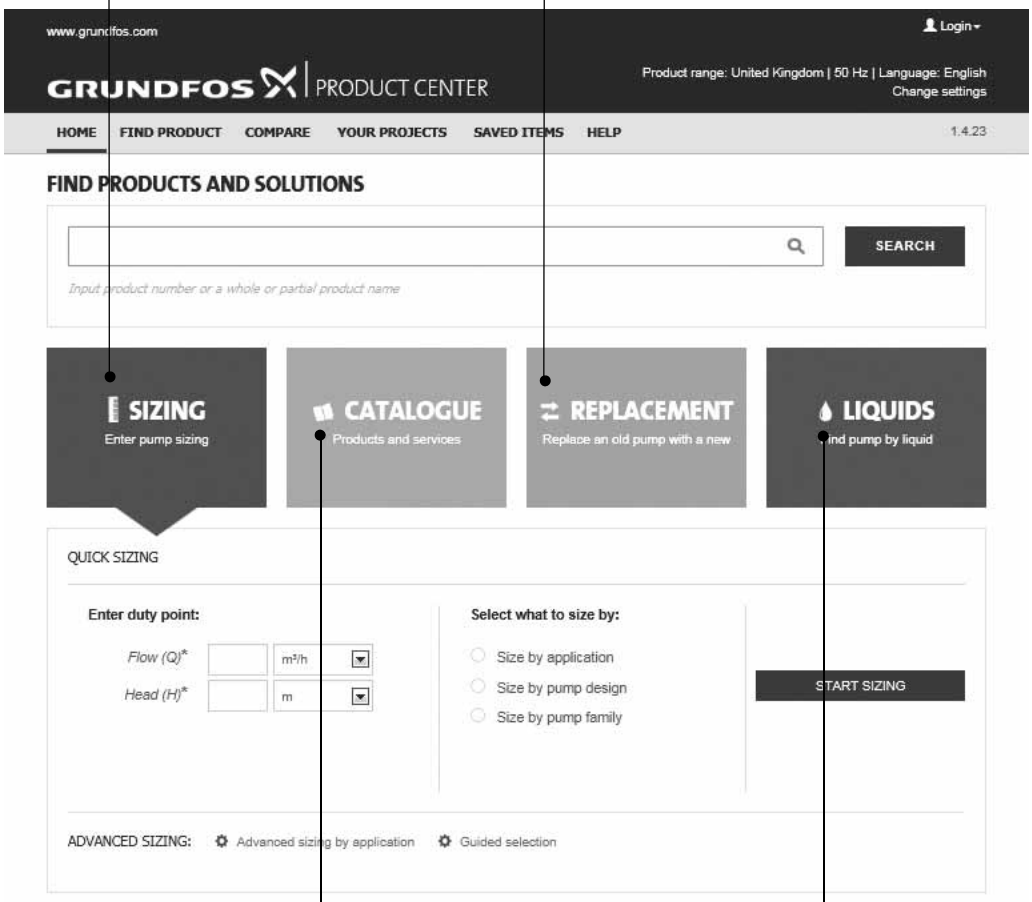
Online search and sizing tool to help you make the right choice.

http://product-selection.grundfos.com

SIZING enables you to size a pump based on entered data and selection choices.

REPLACEMENT enables you to find a replacement product.
Search results will include information on

- the lowest purchase price
- the lowest energy consumption
- the lowest total life cycle cost.



CATALOGUE gives you access to the Grundfos product catalogue.

LIQUIDS enables you to find pumps designed for aggressive, flammable or other special liquids.

All the information you need in one place

Performance curves, technical specifications, pictures, dimensional drawings, motor curves, wiring diagrams, spare parts, service kits, 3D drawings, documents, system parts. The Product Center displays any recent and saved items - including complete projects - right on the main page.

Downloads

On the product pages, you can download installation and operating instructions, data booklets, service instructions, etc. in PDF format.

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