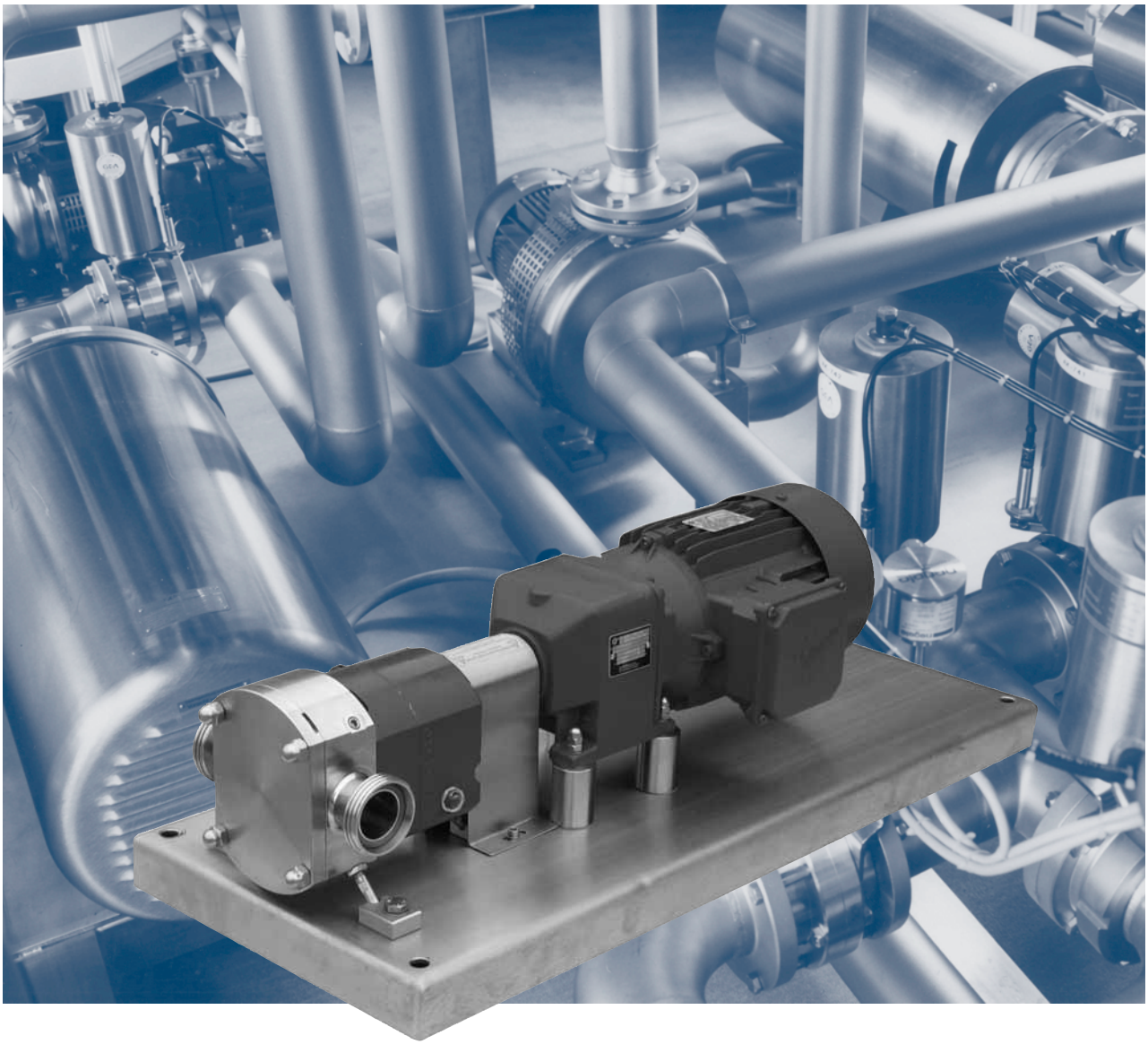
GRUNDFOS **DATA BOOKLET**

Sanitary pumps NOVAlobe

Rotary lobe pumps



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GRUNDFOS

Contents

Introduction

NOVAlobe sanitary pumps

The Grundfos NOVAlobe sanitary pumps are of the rotary lobe, positive displacement type, designed for a wide range of hygienic and sanitary applications within:

- food and beverage
- pharmaceutical, biotechnology and personal care
- other industries, such as pulp and paper.

The NOVAlobe pump range is state-of-the-art within its specific field of application. The pumps can be equipped with a variety of features to meet specific application requirements and can be customised for optimum functionality or performance.

The pump range offers displacements from 0.06 to 1.29 l/rev. Standard differential pressures up to 16 bar.

Hygienic design

The design, materials and material surface finish of sanitary pumps are subject to a variety of national and international rules and regulations, guidelines and laws, such as the

- EU Machinery Directive
- GMP (Good Manufacturing Practices) rules and regulations
- FDA (Food and Drug Administration) regulations
- EU foodstuff hygienic guidelines
- DIN EN 12462 Biotechnology Standard
- EHEDG (European Hygienic Engineering & Design Group) criteria
- QHD (Qualified Hygienic Design) criteria.

The Grundfos NOVAlobe pumps are designed to meet the strictest hygienic requirements on the market. The pumps comply with the recommendations of the EHEDG recommendations and the QHD criteria.

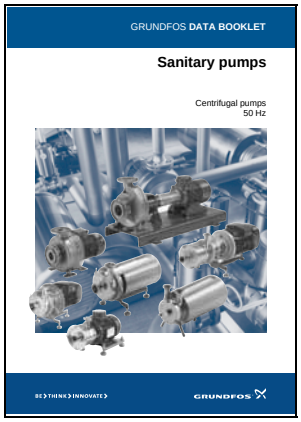
The surface finish of the materials used is of paramount importance to prevent possible breeding grounds for bacteria and germs.

Other Grundfos sanitary pumps

The Grundfos range of sanitary pumps also comprises:

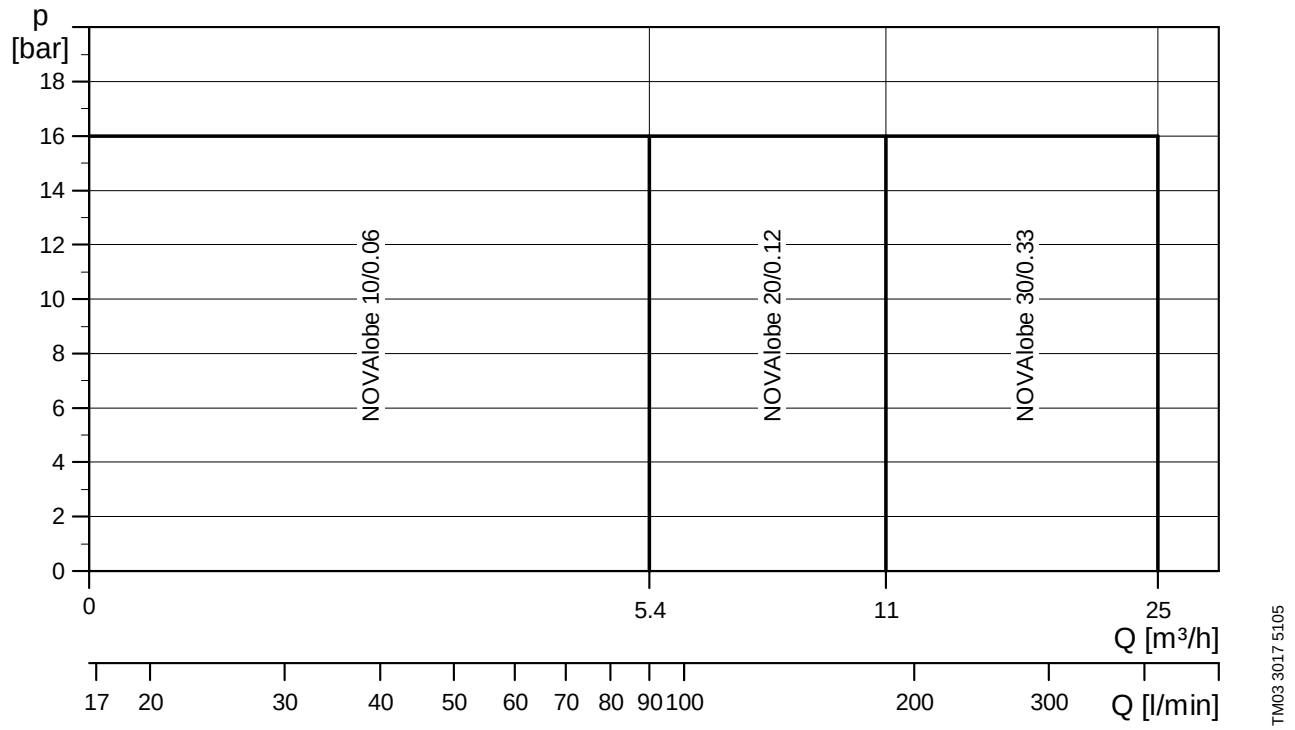
- Euro-HYGIA®
  Single-stage, end-suction centrifugal pumps
- HYGIA® F&B
  Single-stage, end-suction centrifugal pumps
- Contra
  Single-stage or multi-stage, end-suction centrifugal pumps
- durietta 0
  Single-stage or multi-stage centrifugal pumps
- SIPLA
  Single-stage, self-priming side-channel pumps
- MAXA
  Single-stage, end-suction centrifugal pumps
- MAXANA
  Single-stage, end-suction centrifugal pumps.

For further information on these pumps, see the Grundfos data booklet on "Sanitary pumps - centrifugal pumps":

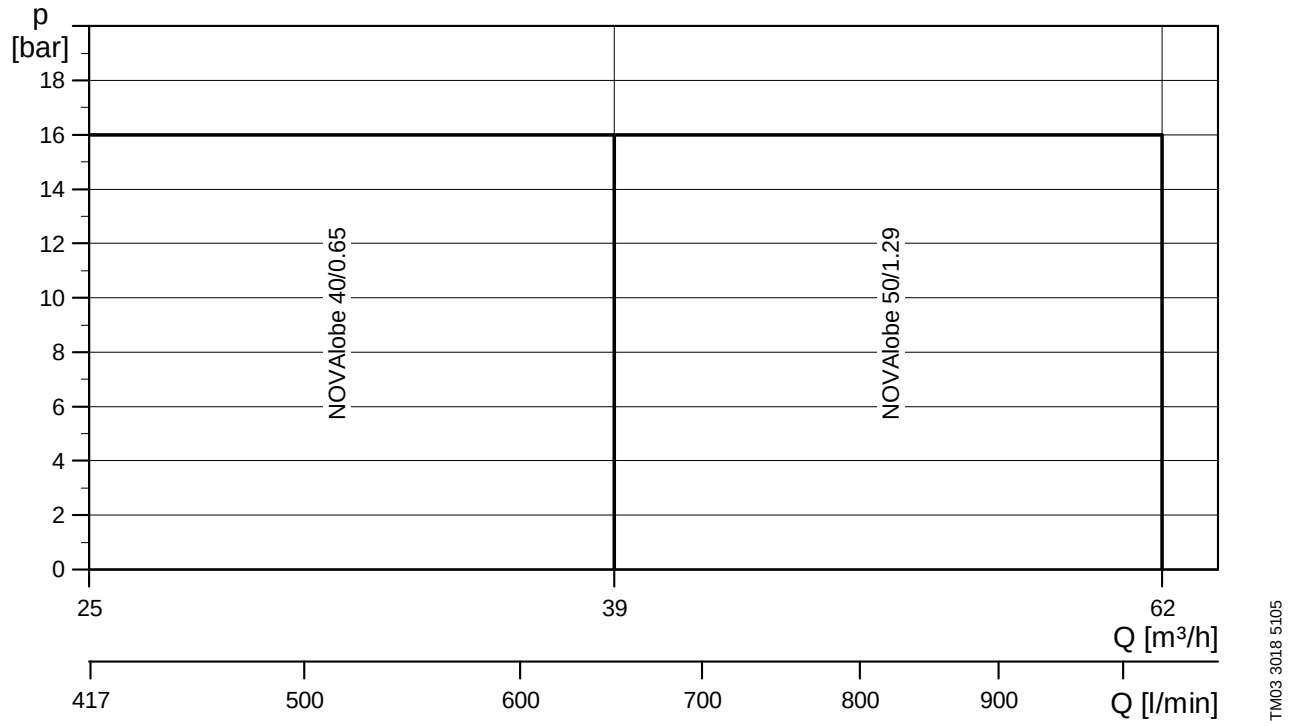


Performance range

NOVAlobe standard range



TM03 3017 5105



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NOVAlobe

GrA2393A

Technical data

Max. differential pressure	16 bar
Displacement	0.06 to 1.29 l/rev.
Max. viscosity	1 to 1,000,000 cP

* Depending on the type of connection.

Applications

The NOVAlobe range of rotary lobe, positive displacement pumps offers reliable, efficient and hygienic operation even under the most demanding conditions. The NOVAlobe is designed for both directions of rotation. The pumps are ideal for gentle handling of high-viscosity media, but suitable for a wide range of hygienic and sanitary applications within industries such as:

Food and beverage

- Dairy (fruit yoghurt, butter, cheese curd, etc.)
- Food processing (sauces, dressing, baby food, etc.)
- Soft drink (syrup, juice, etc.)
- Confectionary and sugar (caramel, chocolate, etc.)
- Meat (sausage meat, pet food, etc.)
- Brewery (yeast).

Pharmaceutical, biotechnology and personal care

- Vaccine/fermentation broth
- Blood products
- Shampoo, lotions, toothpaste and similar products.

Other industries

- Pulp and paper (coating, polymer-dosing, etc.)
- Textile (textile dye, etc.)
- Chemical (oil, etc.)
- Paint/adhesives.

Identification

Example:	**NOVAlobe**	**10**	**/0.06**
Pump range			
Frame size			
Litres per revolution			

Hygienic design

The NOVAlobe pumps comply with the recommendations of the EHEDG recommendations and the QHD criteria:

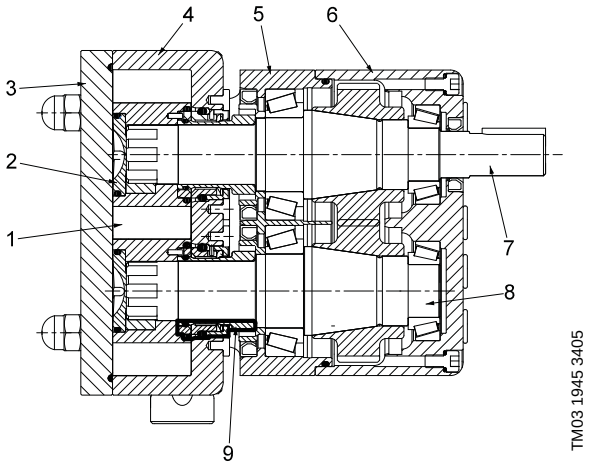
Fig. 1 Certification

The pumps are CIP and SIP capable in compliance with DIN EN 12462. In addition, the pumps also meet the GMP requirements according to the FDA. See page 13.

Surface finish

As standard, all wetted parts are machined to 0.8 µm Ra. Pumps with electro-polished surface finish and low ferrite are available on request. See page 14.

Construction



TM03 1945 3405

Fig. 2 Sectional view

Material specification

Pos.	Component	Material	EN/DIN
1	Rotor	CrNiMo stainless steel	1.4404
2	Rotor retainer	CrNiMo stainless steel	1.4404
3	Front cover	CrNiMo stainless steel	1.4404
4	Rotor case	CrNiMo stainless steel	1.4404
5	Gearbox, front	Carbon steel	
6	Gearbox, rear	Carbon steel	
7	Drive shaft	Stainless steel	
8	Layshaft	Stainless steel	
9	Shaft seal	Silicon carbide/carbon	

General description

Design variations

Standard variation	Description
NOVAlobe bare shaft	Pump without motor. Horizontal/vertical suction and discharge ports.
NOVAlobe complete	Pump with coupling, geared motor and stainless steel baseplate. Horizontal/vertical suction and discharge ports.
Variations on request	**Description**
NOVAlobe SUPER	Stainless steel pump with shrouded coupling and geared motor.
NOVAlobe trolley	Portable pump with coupling and geared motor mounted on stainless steel trolley

See page 16.

Rotors

A number of rotor profile options and materials are available to meet specific application requirements.
See page 8.

Shaft seals

Grundfos offers the following shaft seal arrangements as standard:

- single mechanical seal
- single flushed mechanical seal
- double mechanical seal
- Single O-ring seal
- Double O-ring seal.

See page 10.

Connections

The variety of connections available includes threads to DIN 11864-1 PN 16 and flange to DIN 11864-2 PN 16.

Other connections such as SMS, RJT, clamp Tri-Clover® are available on request.

See page 8 and page 25 to 26.

Super-sterile operation

NOVAlobe offers super-sterile operation by means of:

- vertical ports for self drainage
- increased surface finish $\leq$ 0.4 μm Ra
- electro-polished surface
- elastomers according to the FDA
- sterile barrier at seals and front cover.

Features and benefits

Hygienic/sterile design

- complies with the recommendations of the EHEDG recommendations and the QHD criteria
- easy cleanability
- prevents breeding ground for bacteria and germs.

Robust construction

- long life and minimum risk of galling
- elimination of play.

Unique rotor location and drive

- elimination of play.

Service-friendly design

- front-loaded shaft seal
- unique rotor design
- reduced downtime
- easy maintenance
- minimum life-cycle costs.

High flexibility

- customer-specific solutions
- rotor profile options
- single and flushed mechanical shaft seals
- large selection of connections.

High volumetric efficiency

- less slip and thus smaller pump size required.

Options

Grundfos offers the following optional features:

- Pressure-relief valve
- Aseptic front cover
- Thermal jackets.

See page 23.

NOVAlobe product range

Pump range NOVAlobe	10/0.06	20/0.12	30/0.33	40/0.65	50/1.29
Hydraulic data					
Max. displacement [l/rev.]	0.06	0.12	0.33	0.65	1.29
Max. differential pressure [bar]			16		
Rotor design					
Uni-wing	❍	❍	❍	❍	❍
Bi-wing	●	●	●	●	●
Cycloidal multi-lobe	❍	❍	❍	❍	❍
Wet-end parts					
CrNiMo stainless steel, 316L, 1.4404	●	●	●	●	●
Stainless steel, 1.4435 (low ferrite)	❍	❍	❍	❍	❍
≤ 0.8 µm Ra standard surface finish	●	●	●	●	●
≤ 0.4 µm Ra surface finish	❍	❍	❍	❍	❍
Materials, gearbox					
Carbon steel	●	●	●	●	●
Cast iron	❍	❍	❍	❍	❍
Stainless steel	❍	❍	❍	❍	❍
Elastomer seal types					
EPDM	●	●	●	●	●
FKM	❍	❍	❍	❍	❍
FFKM/FEPS	❍	❍	❍	❍	❍
Shaft seal types					
Single mechanical seal	●	●	●	●	●
Single flushed mechanical seal	❍	❍	❍	❍	❍
Double mechanical seal	❍	❍	❍	❍	❍
Single O-ring	❍	❍	❍	❍	❍
Double O-ring	❍	❍	❍	❍	❍
Materials, seals					
Silicon carbide/carbon (solid)	●	●	●	●	●
Silicon carbide/silicon carbide (solid)	❍	❍	❍	❍	❍
Connections					
Thread to DIN 11851, PN 16 to 40	●	●	●	●	●
Threaded connection, SMS ISO 2037	❍	❍	❍	❍	❍
Threaded connection, IDF ISO 2853 BS 4825-4	❍	❍	❍	❍	❍
Threaded connection, RJT BS 4825-5	❍	❍	❍	❍	❍
Clamp to DIN 32676, PN 10 to 16	❍	❍	❍	❍	❍
Sterile thread to DIN 11864-1, PN 16	❍	❍	❍	❍	❍
Sterile flange to DIN 11864-2, PN 16.	❍	❍	❍	❍	❍
Flange to ANSI 150 LB RF and 300 LB RF	❍	❍	❍	❍	❍
Options					
Integral pressure-relief valve	❍	❍	❍	❍	❍
Aseptic front cover (aseptic operation)		❍	❍	❍	❍
Thermal jackets casing	❍	❍	❍	❍	❍
Thermal jackets front cover	❍	❍	❍	❍	❍
Casing drain	❍	❍	❍	❍	❍

● Standard.
❍ Available on request.

Introduction

The NOVAlobe pump is designed for robust performance. The front taper bearings provide a rigid gearbox design ensuring outstanding performance with:

- close rotor operating clearance
- superior differential pressure capability.

The gearbox/rotor housing interface has been designed to minimise heat transfer between gearbox and rotor housing. This provides:

- reduced dimensional changes due to temperature
- improved bearing performance.

Pumps with vertical suction and discharge ports are fully self-draining through the discharge port to comply with sterilisation requirements.

Rotor

The rotor housing is made of stainless steel to EN/DIN 1.4404, equivalent of AISI 316L. Other materials are available on request.

The NOVAlobe pump unit is able to accommodate different lobe shapes within the same rotor housing configuration. This feature makes the NOVAlobe pump suitable for a wide range of applications.

Rotor profile options

GrA2399

Fig. 3 Uni-wing

GrA2401

Fig. 4 Bi-wing

GrA2400

Fig. 5 Cycloidal multi-lobe

Applications

Uni-wing rotors are particularly suitable for gentle solids handling and dough-like media.

Standard **bi-wing rotors** are a robust and popular choice for most applications.

Cycloidal multi-lobe rotors offer low-shear, gentle product handling with low pulsation and noise levels.

Other rotor types are available on request.

Maximum particle size

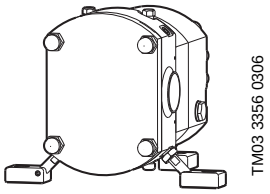
The maximum particle size is based on the rotor hub dimensions.

Note: The particles must be non-abrasive.

NOVAlobe	10/0.06	20/0.12	30/0.33	40/0.65	50/1.29
Max. particle size [mm]	12	16	23	29	35

Connections

Grundfos offers the following connections as standard to suit customers' application requirements.



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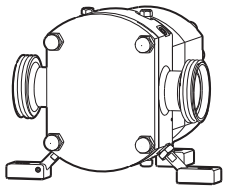
Stub to DIN 11850



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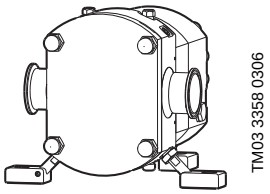
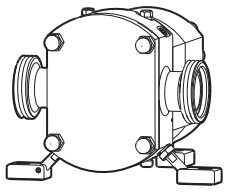
Thread to DIN 11851
PN 16 to 40



TM03 3358 0306

Clamp to DIN 32676
PN 10 to 16



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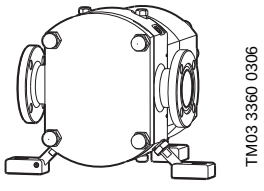
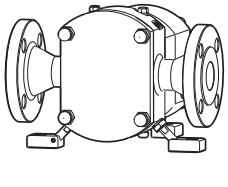
Aseptic thread to DIN 11864-1
PN 16



TM03 3360 0306

Aseptic flange to DIN 11864-2
PN 16



TM03 3361 0306

Flange to ANSI 150 LB RF and
300 LB RF

Fig. 6 Connections

For other connection types as well as applications and design of connection, see page 25 to 26.

Construction

Connection - custom solution

To suit our customers specials application requirements the NOVAlobe pump can be manufactured with special connection designs.

The rectangular inlet gives the pump an additional inlet flow area. This helps the pump to handle viscous media by providing an idial fluid folw.

Feet

The NOVAlobe pumps have adjustable feet for horizontal or vertical orientation of the connection.

The feet height can be adjusted for ease of alignment with drive motors and couplings. This eliminates the need for time-consuming shimming.

The tripod provides extra stability, preventing undesirable movement and vibration.

NOVAlobe shaft seals

The NOVAlobe offers easy-to-replace, front-loaded shaft seals, mounted on replaceable shaft sleeves in a cartridge arrangement for ease of maintenance.

The NOVAlobe is available with two shaft seal types:

- Mechanical shaft seals
- O-ring seals.

Mechanical shaft seals

The mechanical shaft seals are balanced, which makes the seals capable of withstanding a wide variation in rotational speed, high pressures, and high temperatures. The seals are easily cleaned by CIP/SIP procedures.

For special consideration regarding handling of solids, please contact Grundfos.

Grundfos offers following meschanical seal designs:

- Single mechanical seal
- Single flushed mechanical seal
- Double mechanical seal.

Note: The seals must not run dry.

Single mechanical seal

Designed for hygienic applications, the single mechanical seal covers the most common operating conditions in terms of operating pressure, temperature and speed.

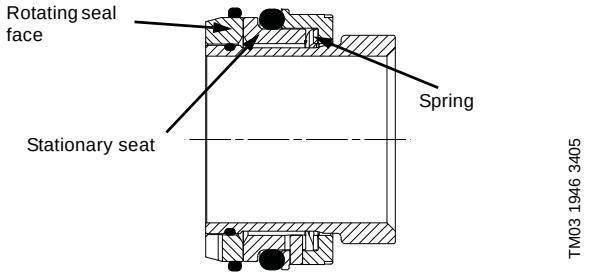


Fig. 7 Single mechanical seal

Single flushed mechanical seal

The single flushed mechanical seal is suitable for applications where media tend to crystallise or harden due to contact with the atmosphere.

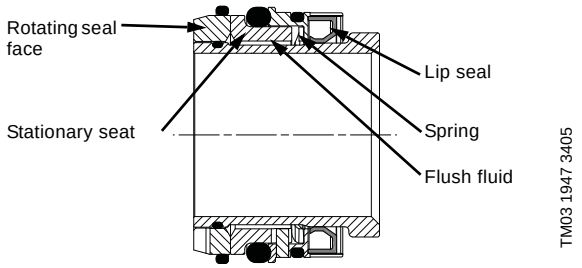


Fig. 8 Single flushed mechanical seal

Double mechanical seal

The robust and simple double mechanical seal is suitable for typical sterile applications where high temperatures are required.

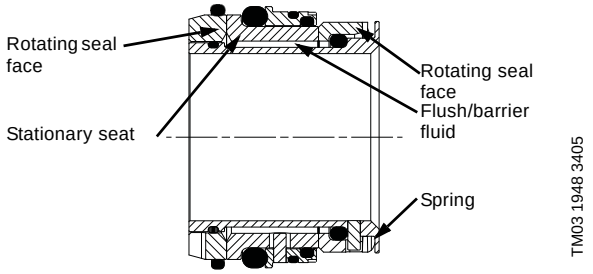


Fig. 9 Double mechanical seal

O-ring seals

O-ring seals have a simple and reliable design using standard O-rings. Grundfos offers following O-ring seal designs:

- Single O-ring seal
- Double O-ring seal.

O-ring seals can be a cheap alternative to the mechanical seals, but be aware that the O-ring seal only is suitable for use in low speed applications, see table below:

NOVAlobe	Operating guide for O-ring seals		
	Normal life time [rpm]	Limited life time [rpm]	Short life time [rpm]
10	0-155	155-180	180-215
20	0-120	120-140	140-170
30	0-90	90-105	105-128
40	0-70	70-80	80-95
50	0-55	55-65	65-80

Normal life time heavily depends on application and choise of O-ring material.

FKM offers the best service life.

Flushed seals

Following NOVAlobe seals can be flushed:

- Single flushed mechanical seals.
- Double mechanical seals.

The flushing system is the same for both flushed singel mechanical seals and flushed double mechanical seals. The NOVAlobe has G 1/8 ports for connection of the flushing system. At delivery the ports are plugged.

Flushing flow

The flow of the flushing liquid keeps the seals clean as well as cool. The flush system may require a high velocity flow to keep the seals clean and free of viscous debris.

The flush flow direction is reversible.

Flowmeters should be used on the inlet side of both seal flush supplies. Flow control should be achieved using flow control valves positioned on the outlet side on both flush systems.

Note. It is important to ensure that both flush systems are independent of each other.

Flushing pressures

Mechanical seal type	Flushing pressure
Single flushed seal	Max. 0.5 bar
Double seal	Max. outlet temp.: 60°C on all accounts underneth the boiling point. Max. difference temp. between inlet/outlet 15K Two possibilities: • The flushing pressure is above the pressure of the pumped medium in order to create a barrier fluid. • The flushing pressure is below the pressure of the pumped medium in order to flush the seal.

NOVAlobe - how it works

Two accurately synchronised rotors rotate in opposite directions, one clockwise and the other anticlockwise. The symmetrical design of the rotors makes the pump suitable for both directions of rotation.

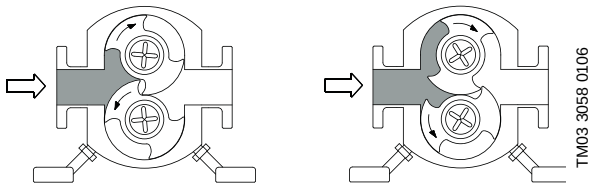


Fig. 10 Operating principle, sequence 1

1. As the rotors rotate in opposite directions, the increased volume between the rotors create a vacuum forcing the medium into the pump.

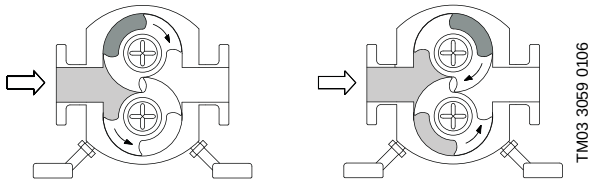


Fig. 11 Operating principle, sequence 2

2. The medium is captured in the chamber between the rotor and the rotor housing and transported to the discharge.

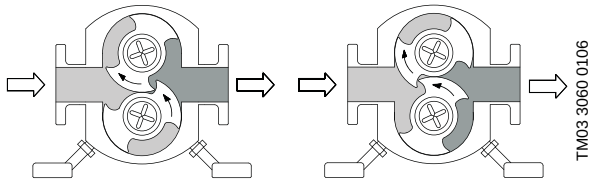


Fig. 12 Operating principle, sequence 3

3. When the medium gets into contact with the discharge side, the opposite rotating rotor wing forces the medium out of the chamber. The chamber volume decreases causing the discharge pressure to increase.

Note: If no precautions are taken, the pump will continue to build up pressure against a closed valve. Liquids are incompressible and rapid pressure build-up will occur, causing pump failure.

Slip

There is no contact between the rotors and the rotor housing. The tolerances between the rotors and the rotor housing allow some of the medium to escape from the discharge side to the suction side.

The slip is the difference between the theoretical flow (pump speed times theoretical displacement) and the actual flow.

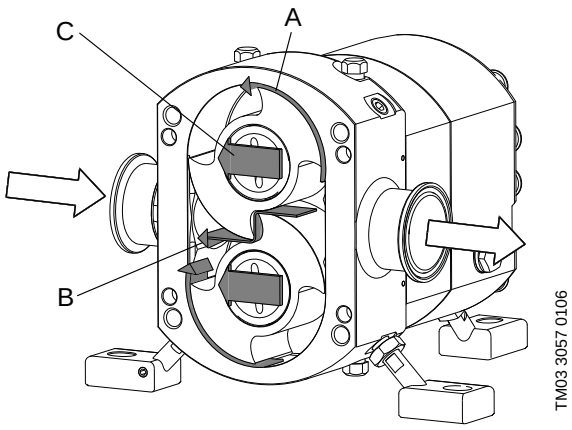


Fig. 13 Slip paths

Slip path A:
Backflow between rotor wings and rotor housing.

Slip path B:
Backflow through the meshing point of the rotor wings.

Slip path C:
Backflow between these components:

- front cover and rotors
- back of rotor housing and rotors.

The slip is affected by three factors, see fig. 14.

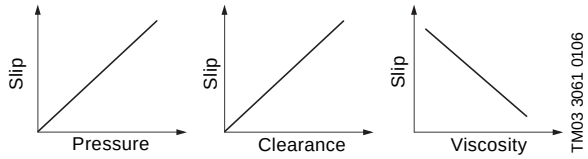


Fig. 14 Slip factors

Pressure
A higher pressure equals more slip.

Clearance
More clearance equals more slip.

Viscosity
A higher viscosity equals less slip.

Approvals and certificates

Approvals

The design, materials and surface finish of sanitary pumps are subject to a number of national and international rules and regulations.

The Grundfos NOVAlobe pumps comply with the recommendations laid down in the EHEDG recommendations and the QHD criteria.

This ensures that dairy, food and other microbially sensitive products are protected from contamination and that all product contact surfaces can be cleaned in place (CIP) or easily dismantled for manual cleaning.

For information on the surface finish of hygienic pumps, see page 14.

EHEDG

Fig. 15 EHEDG symbol

The EHEDG (European Hygienic Engineering & Design Group) develops guidelines and test methods for the safe and hygienic processing of food.

This ensures the microbiological safety of the end product, for example the pumped medium.

The EHEDG symbol is used by manufacturers to indicate compliance with the EHEDG criteria.

QHD

Fig. 16 QHD symbol

The QHD (Qualified Hygienic Design) is a two-phase testing system for the hygienic design and cleanability of components, machinery and plant for aseptic or sterile applications.

This ensures that all surfaces can be cleaned in place (CIP).

The QHD symbol is used by manufacturers to indicate compliance with the QHD criteria.

Certificates

General information

Grundfos offers the following certificates and approvals:

- Hygienic design certificates
  (certificates guaranteeing compliance with the EHEDG and QHD criteria)
- Material certificates
  (certificates stating material specifications)
- Performance certificates
  (test reports guaranteeing and certifying test data of QH, current consumption, speed, curves, etc.)
- Authorised test by third party
  (surveyed performance test)
- ATEX-approved sanitary pumps (according to ATEX directive 94/9/EC)

The certificates must be ordered with the pump.

Approvals and certificates

TM03 0091 3904

Certificate	Standard
EHEDG certificate	
QHD certificate	
Material specification report	
Material report with certificate	
3.1 Traceability	
Inspection certificate	EN 10.204 3.1
Inspection certificate - Lloyds Register of Shipping (LRS) - Det Norske Veritas (DNV) - Germanischer Lloyd (GL) - Bureau Veritas (BV), etc.	EN 10.204 3.1.C
Surface roughness report	
Motor test report	
Standard test report	ISO 9906
Vibration report	
Certificate of compliance with the order	EN 10.204 2.1
Test report - non-specific inspection and testing	EN 10.204 2.2
Report Cleaned and dried pump	
Report Electro-polished pump	

Surface finish of hygienic pumps

In order to meet the demands of the pharmaceutical, food and beverage industries, Grundfos has developed the following surface-finish requirements:

Code	Application	Material	Surface finish
3A2.03	Sterile	1.4404/1.4435 (AISI 316L)	Ra ≤ 0.8 µm
3A2.05	Sterile	1.4435, Fe ≤ 1%	Ra ≤ 0.8 µm
3A3.06	Sterile	1.4435, Fe ≤ 1%	Ra ≤ 0.4 µm
3A3.07	Sterile	1.4404/1.4435 (AISI 316L)	Ra ≤ 0.4 µm

Operating conditions

Pump speed

The NOVAlobe pump is usually driven by a motor through a motor gear. The gear has a variable or a fixed transmission. The performance of positive displacement pumps is regulated by means of the pump speed.

Note: The selection of pump size should be considered carefully. A small-sized pump can deliver a high flow at a high speed. However, a high speed may have an adverse effect on the pumped medium.

Grundfos helps you to select the right pump size for the particular medium and required flow.

Optimum suction

To avoid cavitation, install the pump with the suction port as close to the tank as possible and at the lowest possible point. This ensures optimum suction conditions.

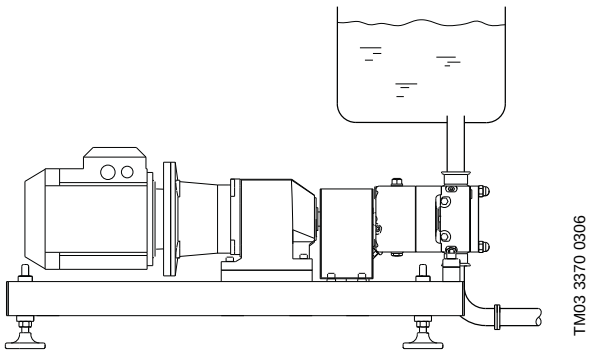


Fig. 17 Optimum installation

Correct installation reduces the pressure loss on the suction side. This is of particular importance when pumping high-viscosity media.

Minimum inlet pressure

To avoid cavitation, make sure that there is a minimum pressure on the suction side of the pump.

NPIPa > NPIPr

NPIPa: **N**et **P**ositive **I**nlet **P**ressure **a**vailable.
NPIPr: **N**et **P**ositive **I**nlet **P**ressure **r**equired.

NPIPr can be read of the curves on the on-line selector tool.

The calculation of NPIPa is shown below.

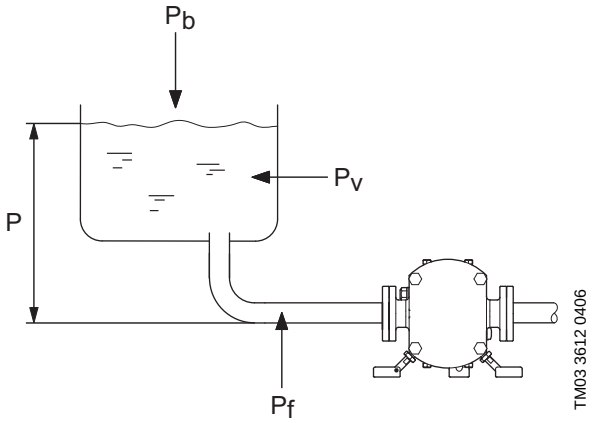


Fig. 18 Schematic drawing

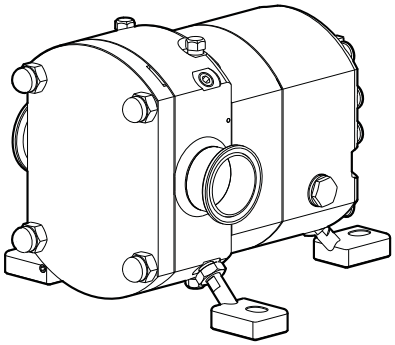
$$NPIPa = P_b \pm P - (P_f + P_v + P_s)$$

P_b	:	Barometric pressure in bar absolute. In open systems, the barometric pressure can be set to 1 bar. In closed systems, P_b indicates the system pressure in bar.
P	:	Static suction pressure from medium in bar.
		$P = \frac{H \times SG}{10}$
		H: Static suction head in metres.
		SG: Specific gravity of the medium
P_f	:	Friction loss in suction line in bar.
		$P_f = \frac{H_f \times SG}{10}$
		H_f: Friction loss in metres.
		SG: Specific gravity of the medium.
P_v	:	Vapour pressure of the medium in bar.
P_s	:	Safety margin; minimum 0.05 bar.

Design variations

The NOVAlobe pump is available in different design variations.

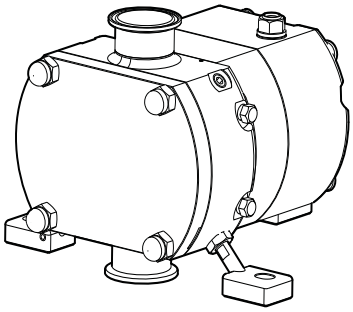
Bare shaft pump, horizontal suction and discharge ports



TM03 3363 0306

Fig. 19 NOVAlobe bare shaft with horizontal suction and discharge ports

Bare shaft pump, vertical suction and discharge ports



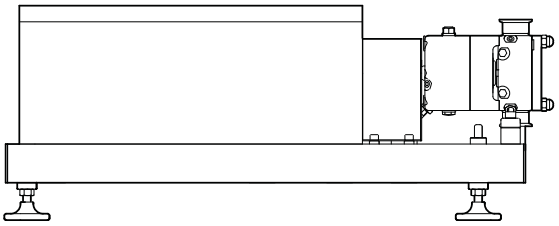
TM03 3362 0306

Fig. 20 NOVAlobe bare shaft with vertical suction and discharge ports

Variations on request

Grundfos offers the following design variations on request:

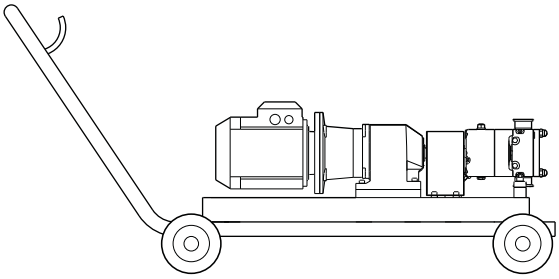
NOVAlobe SUPER



TM03 3942 1206

Fig. 21 NOVAlobe SUPER with stainless steel shroud

NOVAlobe trolley



TM03 3943 1206

Fig. 22 NOVAlobe with coupling and geared motor mounted on stainless steel trolley

For further design options, contact Grundfos.

Mechanical installation

The pump must be installed in such a way that strain from pipework is not transferred to the pump housing.

Clearance requirements

- Small pumps that can be handled by hand require a 300 mm clearance behind the pump/motor. See fig. 23.
- Large pumps that must be handled with lifting gear equipment require a 300 mm clearance behind and a one-metre clearance above the pump/motor.

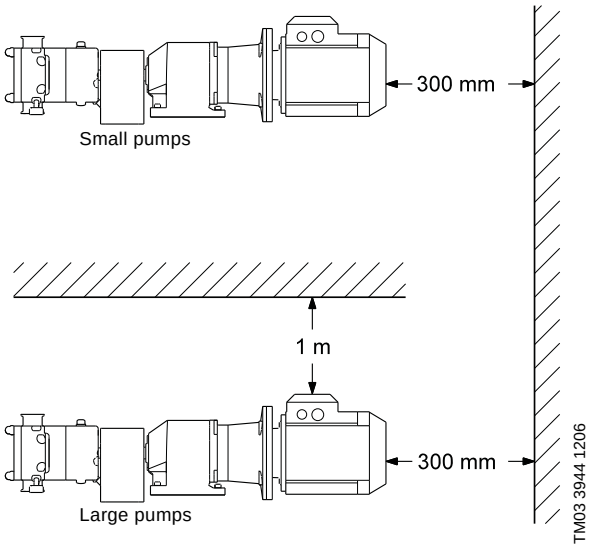


Fig. 23 Clearance requirements

Pipework

The suction and discharge pipes should be of adequate size, taking into account the pumped medium and the suction pressure. The pipework affects the pump in two ways:

- Mechanically
- Hydraulically.

Mechanical impacts

- Make sure that the pump does not support the weight of the pipework or stresses the pipework when installed.
- Make sure that the pipework supports can support the pumped medium. See figures 24 and 25.
- Consider and minimise temperature impacts causing pipework expansion/contraction.
- Do not exceed the permissible nozzle loadings.

Hydraulic impacts

- Keep suction pipe short for best NPSH.
- Keep pipework diameters large to minimise friction loss and shock pulsation.
- Avoid tees, bends, changes in pipe section, restrictions, fittings, etc.
- Design pipework for easy venting to avoid airlocks.

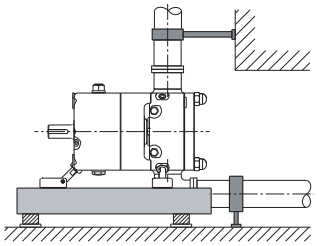


Fig. 24 Pipework supports

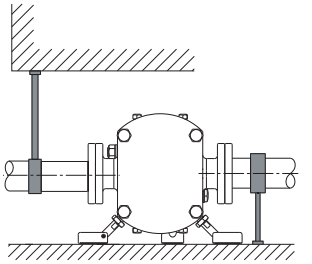


Fig. 25 Pipework supports

Foundation

We recommend that you install the pump on a plane and rigid foundation which is heavy enough to provide permanent support for the entire pump.

Reduction of noise and vibration

Noise and vibration are generated by the pulsating flow of the rotors and by the flow in pipes and fittings. The effect on the environment is subjective and depends on correct installation and the state of the remaining system.

One way of reducing noise and vibrations is by installing expansion joints.

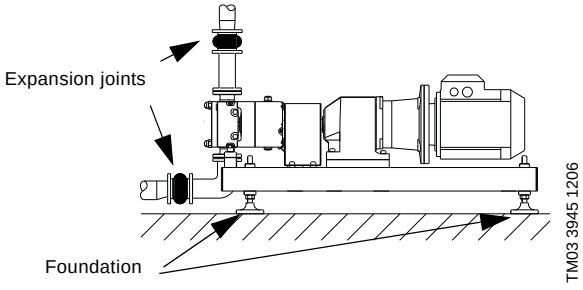


Fig. 26 NOVAlobe with expansion joints

Expansion joints

Install expansion joints for these purposes:

- to absorb expansions/contractions in the pipework caused by changing the temperature of the pumped medium
- to reduce mechanical strains in connection with pressure surges in the pipework
- to isolate mechanical structure-borne noise in the pipework (only rubber bellows expansion joints).

Note: Do not install expansion joints to compensate for inaccuracies in the pipework such as centre displacement of flanges.

Fit expansion joints at a distance of minimum 1 to 1½ times the nominal flange diameter away from the pump on the suction as well as on the discharge side. This will prevent the development of turbulence in the expansion joints, resulting in better suction conditions and a minimum pressure loss on the pressure side. At high viscosity or velocities, we recommend you to install larger expansion joints corresponding to the pipework.

Protection against overpressure

Rotary lobe, positive displacement pumps continue to build pressure when operating against a closed valve.

Overpressure may occur in a fraction of a second and result in pump or system failure. Overpressure typically occurs if a valve closes, a filter becomes blocked or if a second pump operating in parallel starts.

To eliminate overpressure and prevent damage to the pump/system, we strongly recommend to install one or more of the following:

- motor power cut-out equipment
- an integral pressure-relief valve
- an external pressure-relief valve.

Motor power cut-out equipment

The cut-out device will be activated if the power consumption becomes to high.

Integral pressure-relief valve

As an option, Grundfos offers integral pressure-relief valves incorporated in the pump front cover. The valve allows recirculation in the pump chamber. This prevents overpressurerisation as the valve piston lifts at a preset pressure. See page 23.

Note: The integral pressure-relief valve only gives a short term protection against overpressure. As the product recirculates in the pump chamber the temperature will rise quickly.

External pressure-relief valve

An alternative to the integral pressure-relief valve is a by-pass with an external seat-type valve. This protects the pump/system against overpressure, pressure peaks and blockages in the discharge pipe.

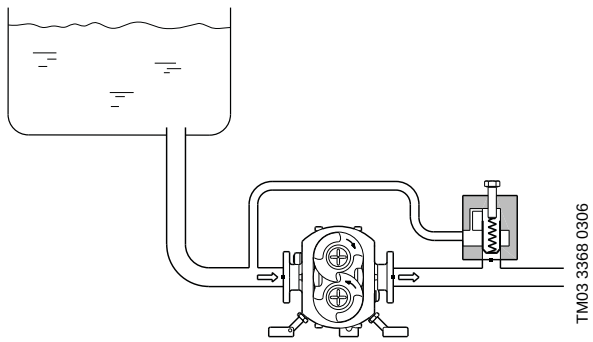


Fig. 27 External pressure-relief valve

Pump selection

For Selection of NOVAlobe please contact Grundfos for assistance.

For correct Sizing Grundfos have develop a Selection tool for NOVAlobe.

Data needed for a correct selection :

Type of product

Viscosity

Density

Flow

Head

Suction condition

Product Temperature

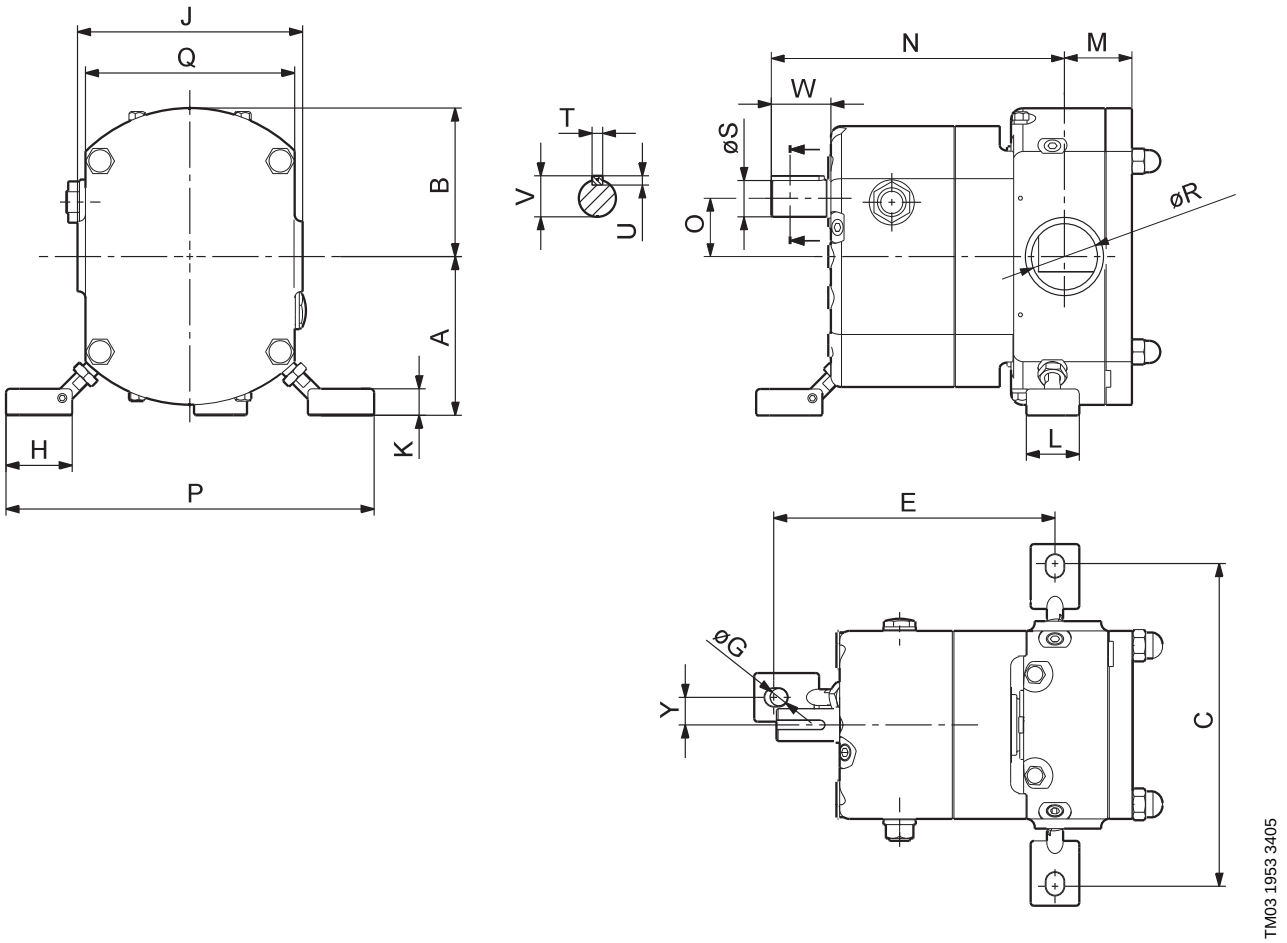
CIP temperature

SIP temperature

Ambient temperature

Particles in the product or other things that need to be considered

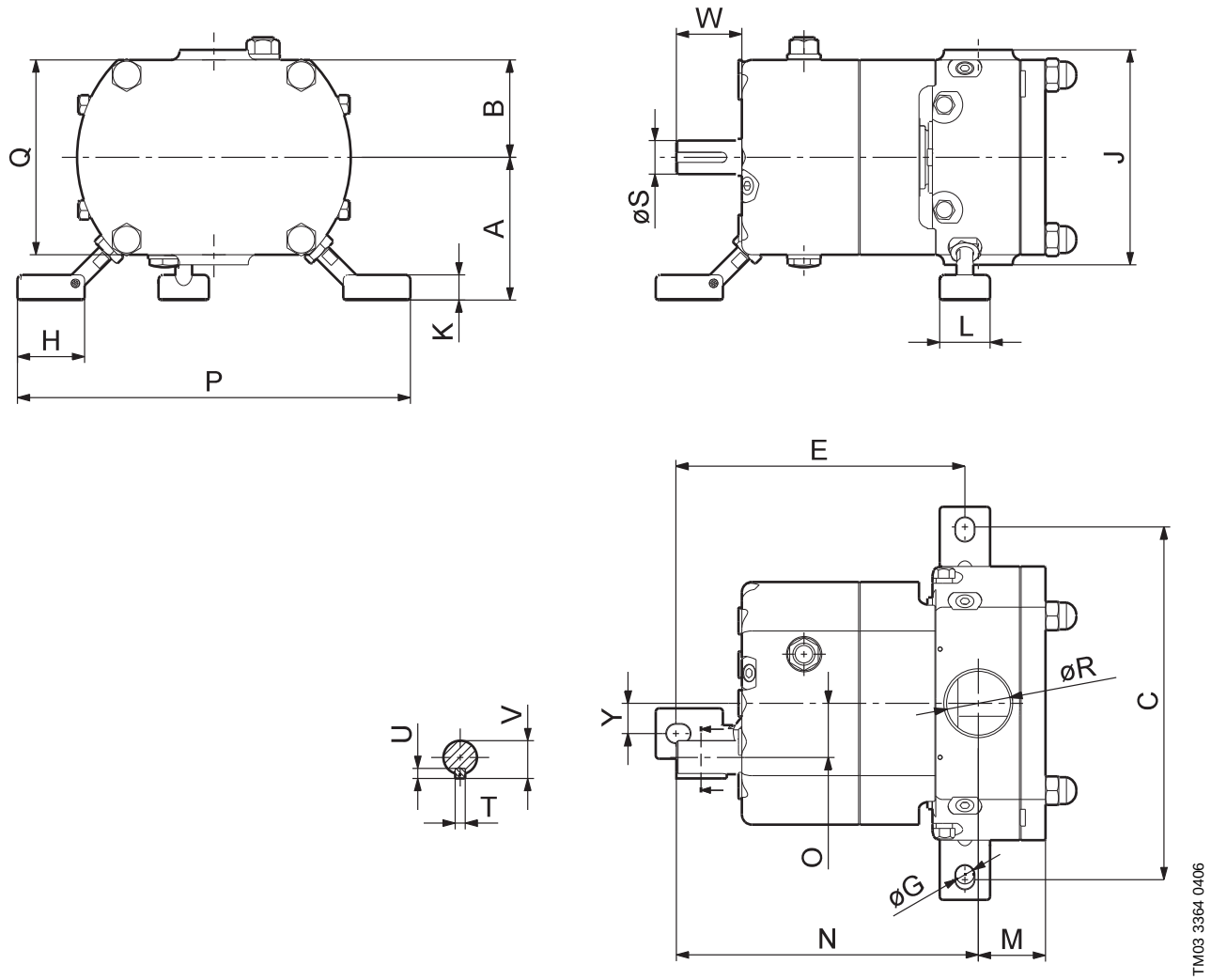
Horizontal suction and discharge ports



NOVAlobe	Port DN	Dimensions [mm]																				
		A	B	C	E	G	H	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	Y
10/0.06	25	75	63	149	140	8.5	30	See table, page 22	15	30	30	149	25	165	90	26	16	5	5	18	31	20
20/0.12	40	95	81.5	199	174	10.2	40		15	30	40	180	32.3	223	116	38	20	6	6	22.5	39	17
30/0.33	50	120	112	242	206	12.5	50		20	40	51	221	44	278	158	50	28	8	7	31	45	23
40/0.65	65	155	141	319	235	17	60		25	50	62	266	57	363	205	66	38	10	8	41	61	37.5
50/1.29	80	190	170	396	296	17	60		25	60	74.5	338	70	432	250	81	48	14	9	51.5	85	37

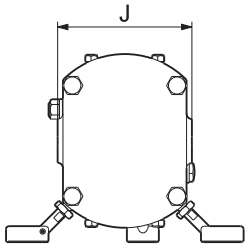
Technical data

Vertical suction and discharge ports

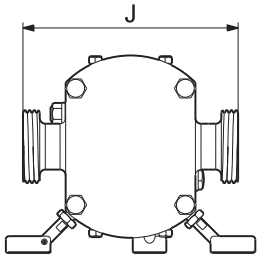


NOVAlobe	Port DN	Dimensions [mm]																				
		A	B	C	E	G	H	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	Y
10/0.06	25	70	45	166	140	8.5	30	See table, page 22	15	30	30	149	25	182	90	26	16	5	5	18	31	20
20/0.12	40	85	58	210	174	10.2	40		15	30	40	180	32.3	234	116	38	20	6	6	22.5	39	17
30/0.33	50	109	79	262	206	12.5	50		20	40	51	221	44	298	158	50	28	8	7	31	45	23
40/0.55	65	135	103	310	235	17	60		25	50	62	266	57	354	205	66	38	10	8	41	61	37.5
50/1.29	80	170	125	390	296	17	60		25	60	74.5	338	70	426	250	81	48	14	9	51.5	85	37

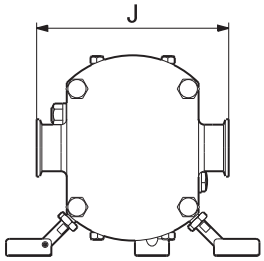
Connection dimensions and weights



TM03 3350 0306

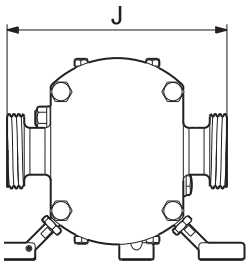


TM03 3351 0306

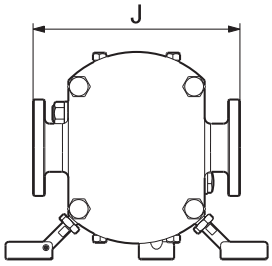


TM03 3352 0306

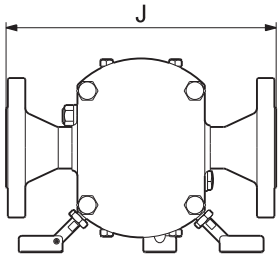
NOVAlobe	Connection DN	Stub DIN 11850		Thread DIN 11851		Clamp DIN 32676	
		J [mm]	Net weight [kg]	J [mm]	Net weight [kg]	J [mm]	Net weight [kg]
10/0.06	25	102	8.95	160	9.19	145	9.08
20/0.12	40	128	18.5	194	18.8	171	18.6
30/0.33	50	170	43.6	240	44.1	213	43.7
40/0.65	65	217	84.9	297	85.7	273	85.3
50/1.29	80	282	146	352	147	318	147



TM03 3351 0306



TM03 3354 0306



TM03 3355 0306

NOVAlobe	Connection DN	Sterile threads DIN 1864-1		Sterile flange DIN 1864-2		Flange ANSI 150	
		J [mm]	Net weight [kg]	J [mm]	Net weight [kg]	J [mm]	Net weight [kg]
10/0.06	25	160	9.24	150	9.44	192	10.9
20/0.12	40	194	18.9	176	19.1	248	21.9
30/0.33	50	240	44.1	218	44.3	290	48.7
40/0.65	65	297	85.8	265	85.9	357	93.0
50/1.29	80	352	148	314	148	402	157

Pressure-relief valve

The NOVAlobe pump is available with an air-loaded pressure-relief valve integrated in the front cover. The pressure-relief valve allows bypass of the pumped medium through the pump when the outlet pressure becomes to high.

Note: The pressure-relief valve provides only a short term safe guard against pump or system damage.

Features of the pressure-relief valve:

- adjustable air-load pressure can be set to maximum allowable operation pressure
- air-lift makes is possible to lift the valve for cleaning purposes or forced bypass
- efficient cleaning (CIP/SIP) of the O-ring in contact with the pumped medium
- possibility for mounting a sensor for registration of valve movement (optional).

Fig. 28 Connections on pressure-relief valve

Air-load

The pressure-relief valve is kept close by pressurized air. The air-load pressure (closing pressure) can be adjusted to keep the pressure-relief valve closed upto allowable operation pressure.

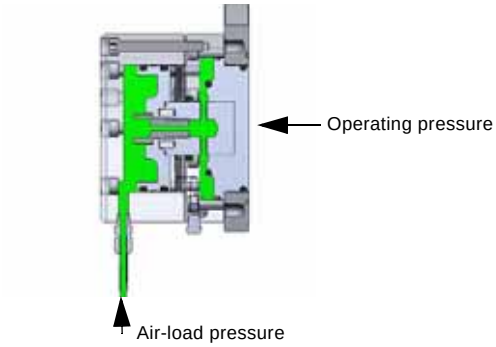


Fig. 29 Air-load pressure

As shown on fig. 29, the closing pressure works on approximately twice the surface area than the system pressure. This allows use of low pressure, standard air supply which is normally available on site.

Approximate pressure ratio 0.21-0.24.

Air pressure required [bar]= approximate ratio x pump outlet pressure [bar].

Maximum allowable air-load pressure: 4 barG.

Air-lift

The NOVAlobe rotary lobe pump is generally used on hygienic duties. Cleaning of the whole piston surface is made easy when the piston is lifted.

The air-lift feature can also be used to make a forced bypass.

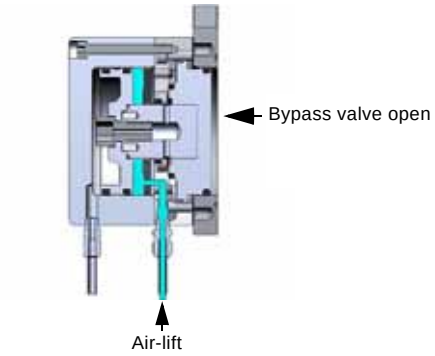


Fig. 30 Air-lift

Cleaning of the pressure-relief valve

It is recommended to clean the pressure-relief valve, at the same time as the pump is being cleaned. Cleaning of the piston area is acomplished on both sides of the main O-ring seal.

Fig. 31 Cleaning of the pressure-relief valve

Sensor fitting capability

An optional design of the pressure-relief valve makes it possible to mount a sensor to provide the user with status information.

A sensor is not supplied as standard.

Aseptic front cover

The pump is available with a double-sealed aseptic front cover. By means of a circulating barrier fluid, the aseptic front cover and the double mechanical seals increase safety when operating in applications requiring a high level of containment.

This provides these benefits:

- increased resistance to bacteria penetration
- improved handling of bacteria/viruses
- increased cleanability
- increased sterile/hygienic performance.

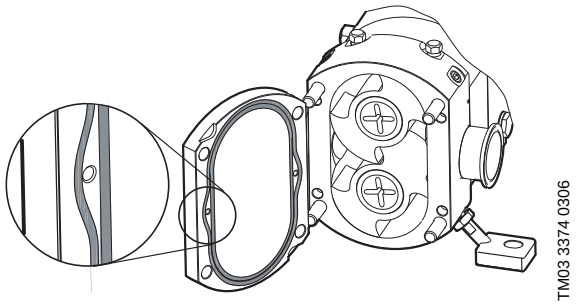


Fig. 32 Aseptic front cover

Thermal jackets

Thermal jackets are available for the front cover and rotor housing.

Thermal jackets contribute to control the temperature of the pump and the pumped medium. The primary purpose of the thermal jackets is to ensure that media that solidify at ambient temperatures are kept in a liquid state by heating the pump chamber. Alternatively, the thermal jackets are suitable for cooling the pumped medium.

Jacketed front cover

A groove is machined into the front cover in a way that ensures a high thermal efficiency by a large surface contact area.

Fig. 33 Jacketed front cover

Jacketed rotor housing

A groove is machined into the rotor housing. The integral heating jacket provides these benefits:

- high heat transfer efficiency
- heat transfer at pump centre
- no crevices for bacteria to collect
- no bulky jacketing.

The heat loop is placed close to the shaft seals. This increases life time of the seal and prevent seal breakage during start-up.

Connection selection guide

Selection of connection according to application

The tables below are intended as a general guide. The selection of connections often depends on local conditions.

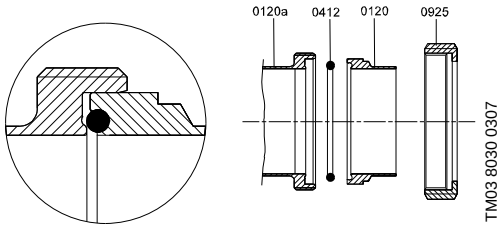
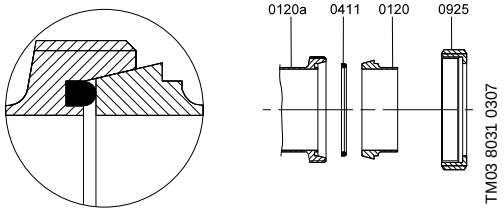
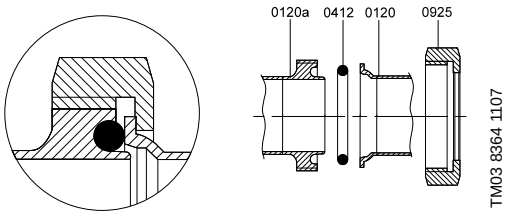
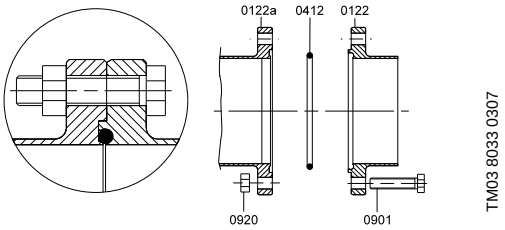
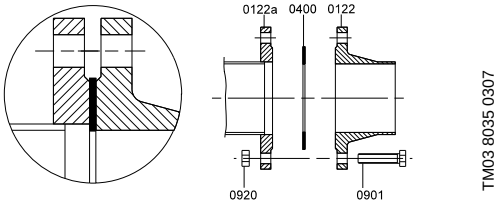
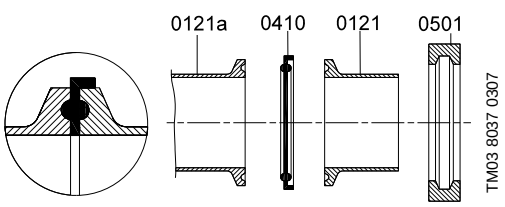
Connection		Application																				
		Beverages					Food						Life science and personal care			Industrial applications						Cleaning	
Type	Standard	Breweries	Wine	Juice	Alcohol	Soft drinks	Confectionary	Dairies	Frying oil	Food processing	Syrup	Meat packing	Pure-water systems, WFI	Biotechnology	Perfumes and lotions	Glue and paint	Purification systems	Chemical handling systems	Environmental handling systems	Surface treatment systems	Biofuel	CIP	SIP
Threaded connection	DIN 11864-1	●		●	●	●							●	●	●							●	●
Threaded connection	DIN 11851	●	●	●	●	●	●	●	●	●	●	●										●	
Threaded connection, SMS	ISO 2037	●		●		●		●			●											●	
Threaded connection, RJT	BS4825-5	●	●	●	●	●	●	●	●	●	●	●										●	
Flange	DIN 11864-2	●	●	●	●	●		●		●	●		●	●	●							●	●
Flange, ANSI 150 LB RF	ANSI															●	●	●	●	●	●		
Clamp	DIN 32676												●	●	●				●		●		
Clamp, Tri-Clover®	ASME BPE												●	●	●								
Stub	DIN 11850																						

● Typically used.

Connection selection guide

Design

The following tables show the design of the different connection types.

Connection	Standard	Design
Threaded connection Typical applications: • Life science/pharmaceutical	DIN 11864-1	
Threaded connection Typical applications: • Beverages • Food	DIN 11851	
Threaded connection, RJT Typical applications: • Life science/pharmaceutical.	BS4825-5	
Flange Typical applications: • Life science/pharmaceutical.	DIN 11864-2	
Flange, ANSI 150 and 300 LB RF Typical applications: • Industrial applications.	DIN EN 1092-1 ANSI	
Clamp Typical applications: • Life science/pharmaceutical.	DIN 32676	

Description of components

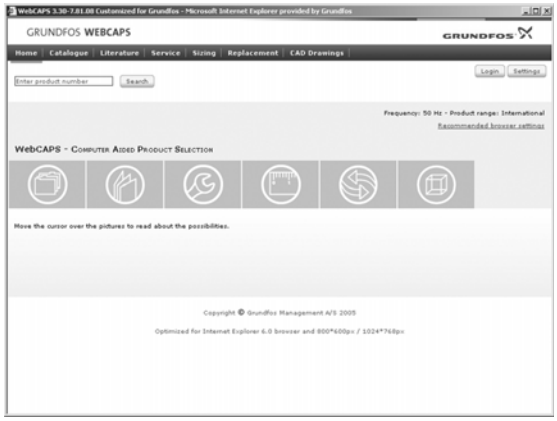
Pos.	Description
0120	Threaded connection
0120a	Threaded connection in pump housing
0121	Clamp connection
0121	Clamp connection
0122	Flanged connection

Pos.	Description
0122a	Flanged connection in pump housing
0400	Gasket
0410	Profile gasket
0411	Circular joint ring
0412	O-ring

Pos.	Description
0501	Clamp ring
0901	Hexagon screw
0920	Hexagon nut
0925	Grooved union nut

Further product documentation

WebCAPS



WebCAPS is a **Web**-based **C**omputer **A**ided **P**roduct **S**election program available on www.grundfos.com.

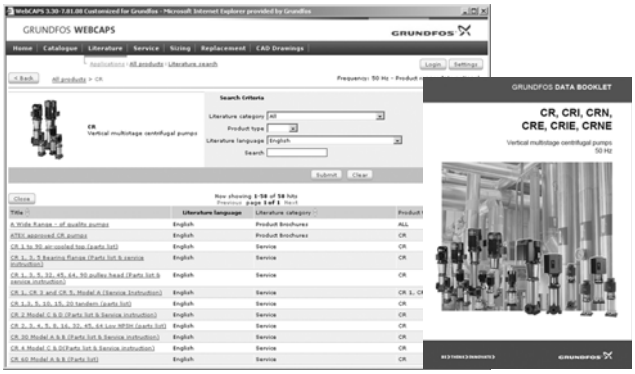
WebCAPS contains detailed information on more than 185,000 Grundfos products in more than 20 languages.

In WebCAPS, all information is divided into 6 sections:

- Catalogue
- Literature
- Service
- Sizing
- Replacement
- CAD drawings.

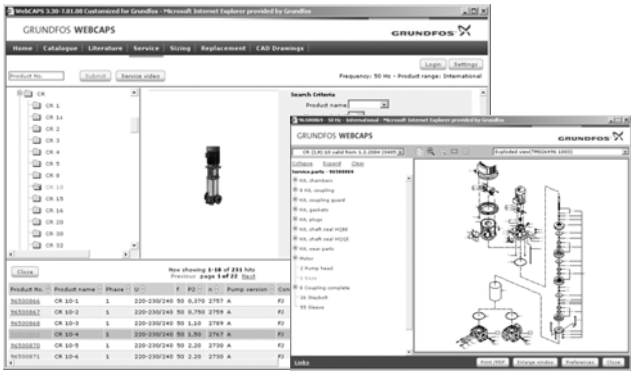
Catalogue

This section is based on fields of application and pump types, and contains
- technical data
- curves (QH, Eta, P1, P2, etc) which can be adapted to the density and viscosity of the pumped liquid and show the number of pumps in operation
- product photos
- dimensional drawings
- wiring diagrams
- quotation texts, etc.



Literature

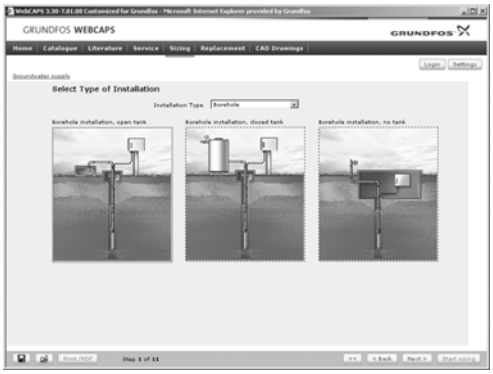
In this section you can access all the lastest documents of a given pump, such as
- data booklets
- installation and operating instructions
- service documentation, such as Service kit catalogue and Service kit instructions
- quick guides
- product brochures, etc.



Service

This section contains an easy-to-use interactive service catalogue. Here you can find and identify service parts of both existing and discontinued Grundfos pumps.
Furthermore, this section contains service videos showing you how to replace service parts.

Further product documentation



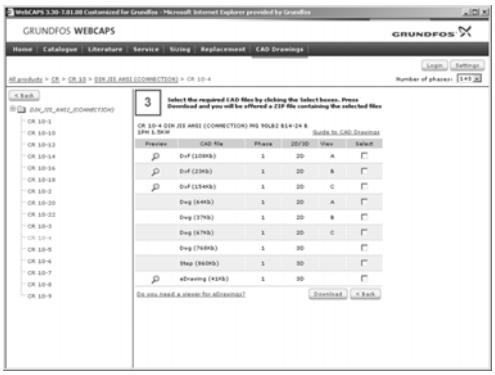
Sizing

This section is based on different fields of application and installation examples, and gives easy step-by-step instructions in how to
- select the most suitable and efficient pump for your installation
- carry out advanced calculations based on energy consumption, payback periods, load profiles, life cycle costs, etc.
- analyse your selected pump via the built-in life cycle cost tool
- determine the flow velocity in wastewater applications, etc.

Replacement

In this section you find a guide to selecting and comparing replacement data of an installed pump in order to replace the pump with a more efficient Grundfos pump.
The section contains replacement data of a wide range of pumps produced by other manufacturers than Grundfos.

Based on an easy step-by-step guide, you can compare Grundfos pumps with the one you have installed on your site. When you have specified the installed pump, the guide will suggest a number of Grundfos pumps which can improve both comfort and efficiency.



CAD drawings

In this section it is possible to download 2-dimensional (2D) and 3-dimensional (3D) CAD drawings of most Grundfos pumps.

These formats are available in WebCAPS:

2-dimensional drawings:
- .dxf, wireframe drawings
- .dwg, wireframe drawings.

3-dimensional drawings:
- .dwg, wireframe drawings (without surfaces)
- .stp, solid drawings (with surfaces)
- .eprt, E-drawings.

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Subject to alterations.

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