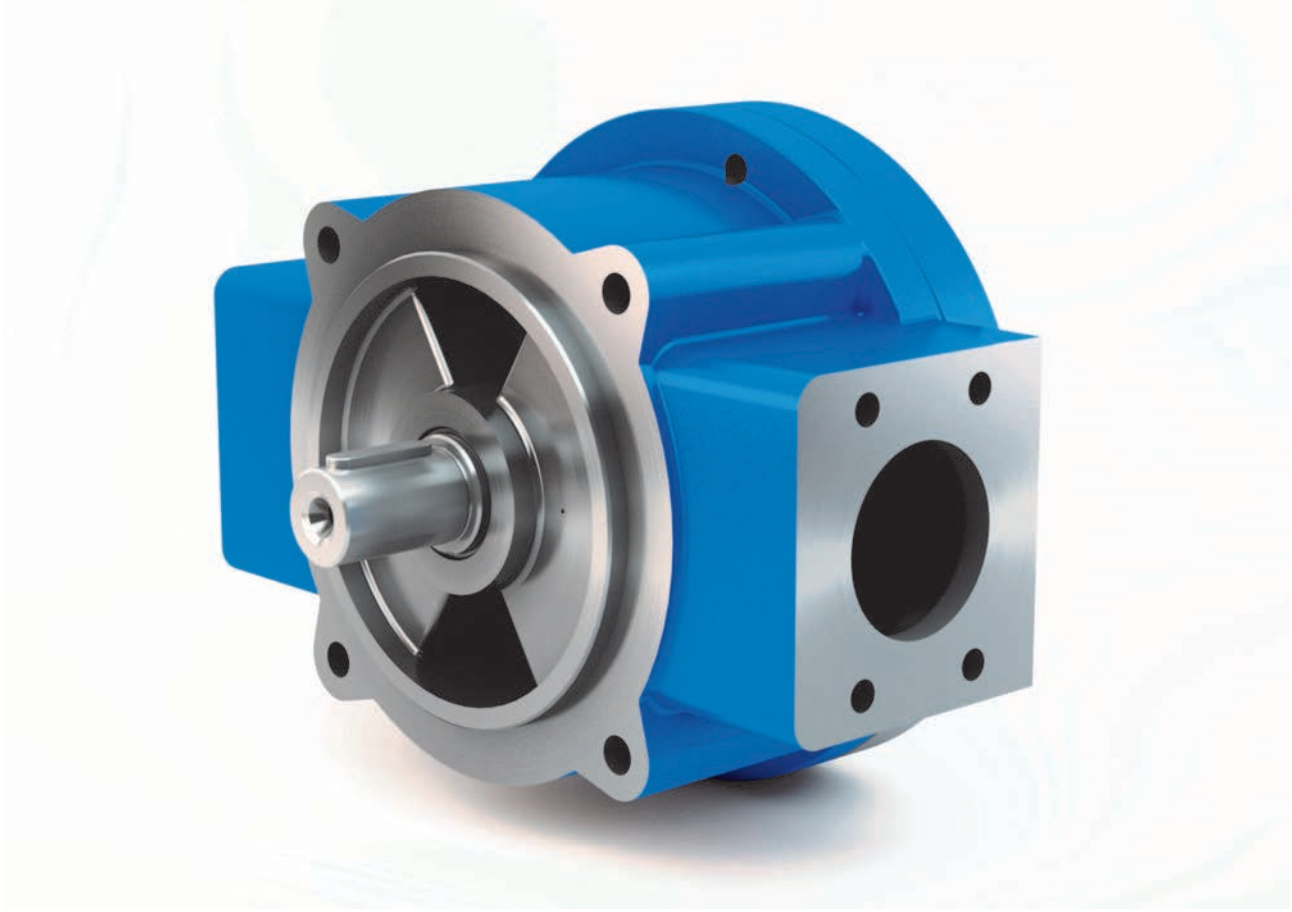
RICKMEIER®
PUMPENTECHNOLOGIE

Data sheet

Gear pumps
R4.5/35 to R6.0/160 UNI



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An example configuration is shown on the title page. The delivered product may be different than the one shown.

Table of contents

1 General information

The technical data in this catalogue are intended for general information. During installation, operation and maintenance, the operating instructions and the information specified on the products must be observed.

Changes to the technical data, selection and ordering data, accessories and deliverability are reserved.

All dimensions are in millimetres.

2 Areas of application

RICKMEIER gear pumps are used primarily in oil hydraulics, lubrication technology and for the transport of various oils or lubricating substances.

Typical areas of application		
General machine construction	Automobile manufacturing	Apparatus construction
Construction machines	Mining technology	
Chemical plant construction		
Diesel motors	Printing machines	
Electric motor construction		
Vehicle technology		
Gas turbines	Gearing	Foundry technology
Woodworking technology		
Industrial gear manufacturing		
Refrigeration technology	Compressor construction	Power plant construction
Engine and motor construction		
Paper machines	Pump construction	
Ship construction		
Textile machines		
Compressor construction		
Water turbines	Rolling mill industry	Machine tools
Wind power generation		
Cement factory construction		

Typical flow media	
Waste oil	ATF oil
Drilling oil	
Diesel fuels	
Emulsions	
Gear oil	
Heating oils	Hydraulic oil
Motor oil	
Polyglycol oil	Polyalphaolefin oil
Cutting oil	Heavy oil
Heat transfer oil	
Drawing oil	Other flow media on request

Fig. 1: Application examples

3 Description

3.1 Design

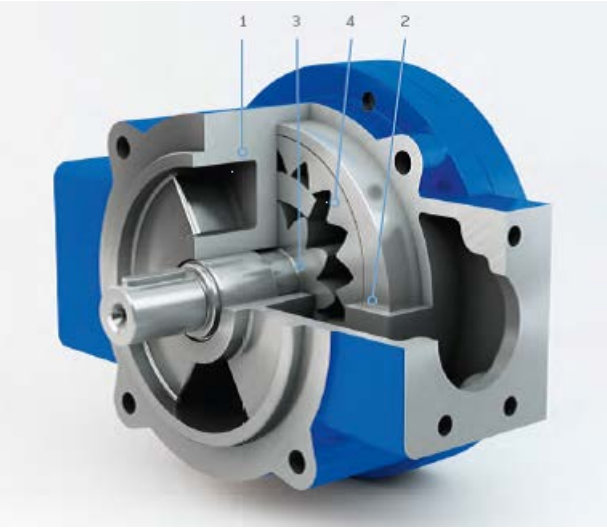


Fig. 2: UNI pump

1	External casing with pipe connections	2	Gear casing
3	Driving gear shaft	4	Annulus

3.2 Product description

RICKMEIER UNI pumps always pump in one direction of flow. This characteristic makes UNI pumps ideal for all applications where a reversal of the direction of flow is undesirable. If the direction of rotation is reversed, the UNI pump switches over automatically, at the same time maintaining the direction of flow. The sophisticated design with a minimum number of parts offers significant advantages over other solutions.

RICKMEIER UNI pumps are characterised by their compact design, which allows integration into confined installation spaces (e.g. in wind power plants, marine transmissions or gas generators). Compared with other solutions, the RICKMEIER UNI pump offers low flow resistance even at high viscosities, i.e. little internal pressure loss.

RICKMEIER UNI pumps have no wear parts such as seals and valves, which makes them extremely low-maintenance and allows them to be used over very long operating times with no maintenance effort required.

4 Functioning principle

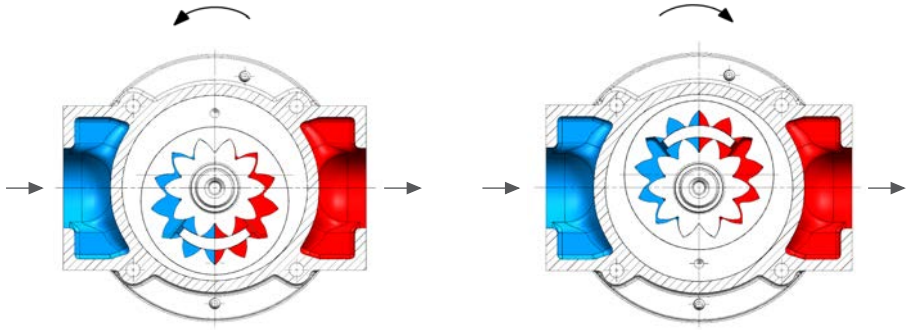


Fig. 3: Internal gear pump delivery principle

UNI pumps are internal gear pumps and therefore rotary displacement pumps. When the driving gear shaft and the annulus turn, the medium enclosed in the space between the teeth is transported from the suction to the pressure side, where it is displaced towards the pressure side by the intermeshing teeth. A crescent acts as a seal between the suction and the pressure side. The transport of the flow medium results in a pressure drop on the suction side of the gear pump. The flow medium compensates for this pressure drop by flowing in, thereby maintaining the feed process.

This process is the same for both gaseous and liquid media. As a result, the gear pump is capable of priming the suction pipe itself until it is completely filled with liquid flow medium.

Note

The venting of the suction line is not possible under the following conditions:
- The suction line is leaking which means that a vacuum cannot develop.
- The pressure in the suction-side pipeline system and/or tank is too low to allow a subsequent flow of the pumped medium. This is possible if a vacuum is present or if the liquid level is too far below the gear pump.

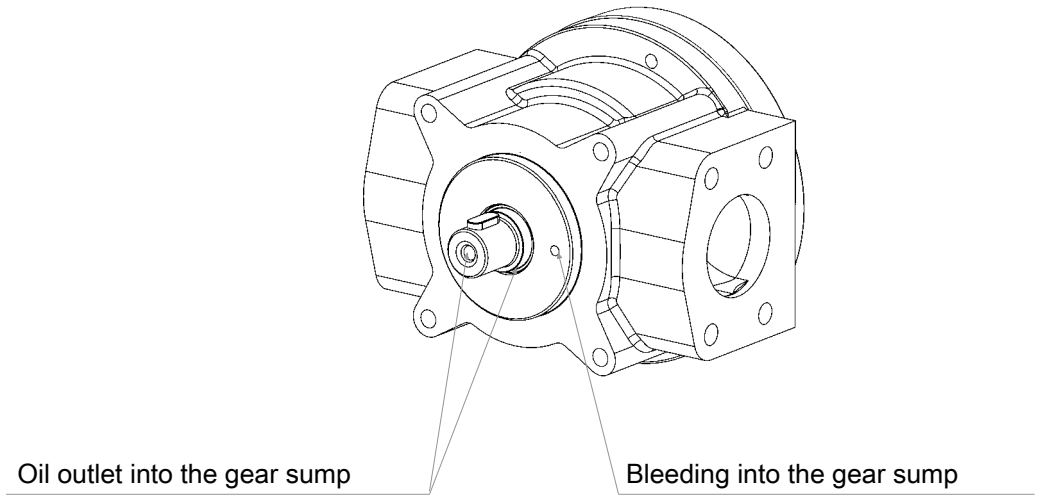


Fig. 4: Bearing oil outlet and continuous vent

To support priming of the system, all UNI pumps have a continuous vent with a diameter of 1.5 mm on the pressure side.
In addition, we recommend the installation of a bleeder valve in the pressure line of the system.

Note

RICKMEIER UNI pumps have no rotary shaft seal, as they are designed for direct attachment (e.g. to transmission casings). The bearing oil of the gear pump flows out of the drive-side friction bearing and the perforated driving gear shaft into the oil sump.

Note

Make sure that both the suction and pressure lines are depressurised at the moment of reversal. Make sure that in rated operation, the pressure on the outlet side of the gear pump is at least 1 bar (manometric).

Note

The gear pump must be secured using an external pressure relief valve.

5 Direction of rotation and flow

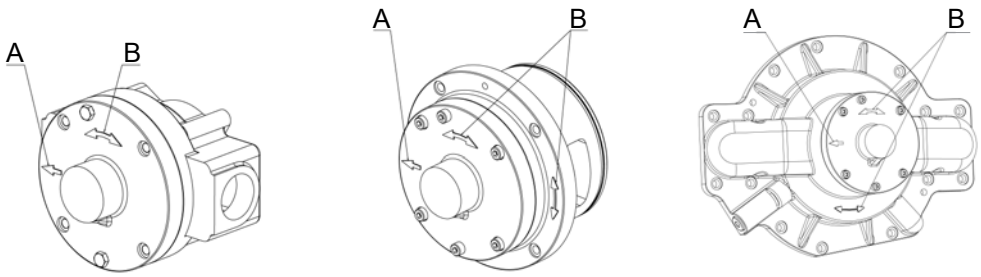


Fig. 5: Direction of rotation and flow

A Direction of flow arrow B Direction of rotation arrow

The direction of rotation of the gear pump is random and indicated by the direction of rotation arrow on the gear pump.

The direction of flow of the gear pump is constant and indicated by the direction of rotation arrow on the end cover of the gear pump.

6 Standard design and variants

The variable modular system of RICKMEIER UNI pumps makes it possible to implement a wide variety of material, casing and functional variants.

In addition to a standard version, the gear pumps can be adapted to the respective application due to the diverse and variable possibilities.

6.1 Materials

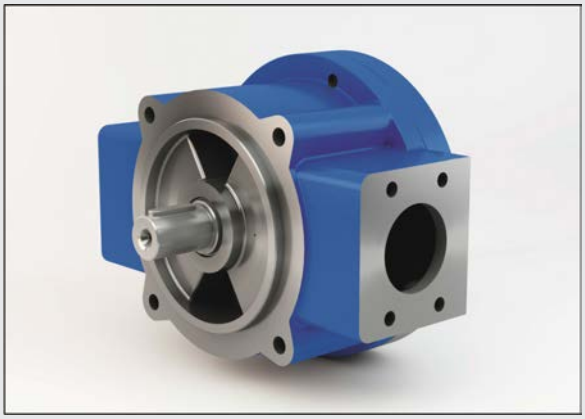
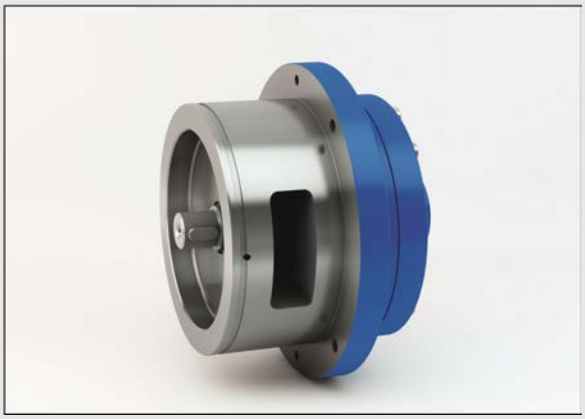
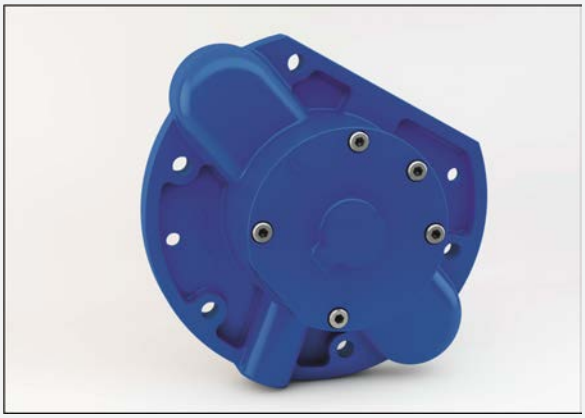
	Standard	Alternative
Casing	– EN-GJL-250 (GG-25)	
Gear shafts	– Case-hardened steel (16MnCrS5)	
O-rings	– FKM	– HNBR – EPDM – Additional upon request
Friction bearing	– Composite bearing type P10/DU	– Friction bearings free of ferrous and non-ferrous metals – Additional upon request
Corrosion protection	– 2-component paint, RAL 5002	– Various coating materials and structures available upon request, for example similar to DIN EN ISO 12944-C4

Tab. 1: Materials

6.2 Casing variants

As standard, the pipe connections are designed with SAE flange pattern in accordance with ISO 6162.

Alternatively, application specific casing variants can be supplied depending on customer requirements.

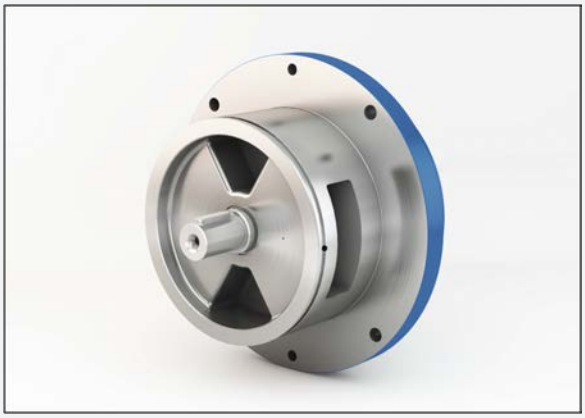
Standard	Alternative (customer-specific solutions in any form)
Flange pump with metric SAE flange pattern in accordance with ISO 6162	Flange pump with threaded hole (thread)
	
Example: R4.5 (SAE 2, nominal diameter 50)	Example: R4.5/45
	Plug-in pump for installation
	
Example: R6.0 (SAE 2.1/2, nominal diameter 65)	Example: R4.5/45
	Face mounting pump, integrated pipework
	
	Example: R4.0/35

Tab. 2: Casing design variants

6.3 Drive concepts

In the standard design, UNI pumps have a cylindrical shaft end and fitted key.

Shaft ends are available in a wide range of versions or can be equipped with drive pinions or clutches to allow adaptation to customer interfaces.

Standard	Alternative
Cylindrical, with fitted key	Driving gear with additional bearing
	
Example: R6.0/80	Example: R4.5/54
	With clutch
	
	Example: R4.5/45

Tab. 3: Drive concept design variants

6.4 Attachment bearing

Optional, z. B. at increased radial load on the shaft journal or pinion drive, an additional bearing can be provided in the pump casing. In addition, separate attachment bearing units can be designed for special applications.

Fig. 6: UNI pump with additional attachment bearing (example: R6.0/100)

6.5 Non-return valve

Both the suction and the pressure side must be depressurised when switching the UNI pump over to change the direction of rotation. To ensure this, an optional non-return valve can be integrated in the pump discharge nozzle as a special design.

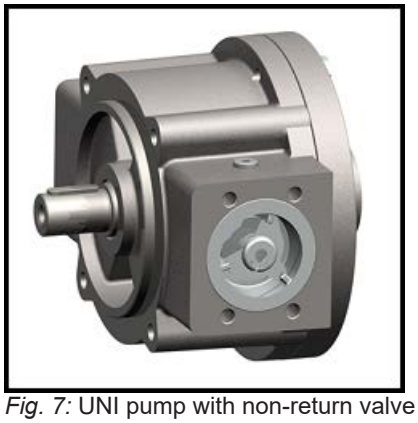


Fig. 7: UNI pump with non-return valve on the pressure side (example: R6.0/160)

6.6 Noise optimisation

The RICKMEIER UNI pump is particularly low-noise compared to other models.
In applications with flow media with increased air content, a significant noise pollution by the gear pump is often determined. The pump casings of UNI pumps can be optionally equipped with an internal additional machining, which in this case results in a significant reduction of the sound pressure level.

Depending on operating data and air content, sound pressure level reductions of up to 15 dB(A) are possible. The delivery performance and efficiency of the gear pump are not adversely affected by this, but no noise reduction is to be expected due to this modification in the case of flow medium that do not contain air.

Note

As an alternative to the UNI pump, our standard R5 series can be fitted with a UNI valve for specific applications. In this case, maintenance of the flow direction when the direction of rotation is reversed is realised via spring-loaded switching valves integrated in the end cover.

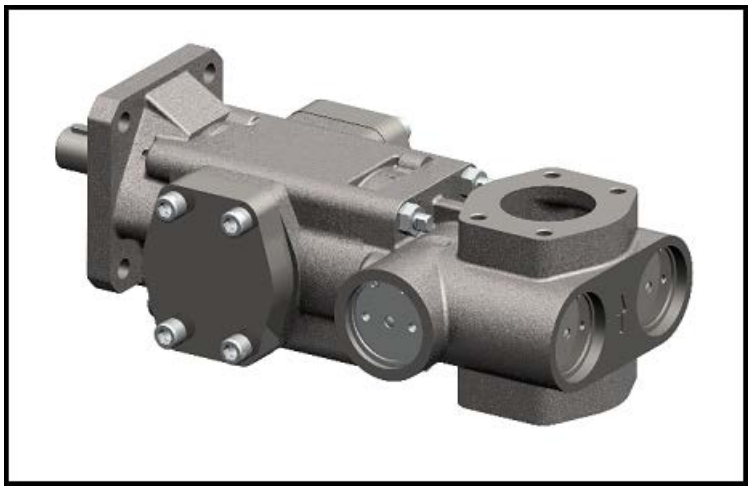


Fig. 8: Standard R5 series with UNI valve (example: R45/160)

7 Designation and configuration

7.1 Type key

The designation of the RICKMEIER UNI pumps is made according to the following key:

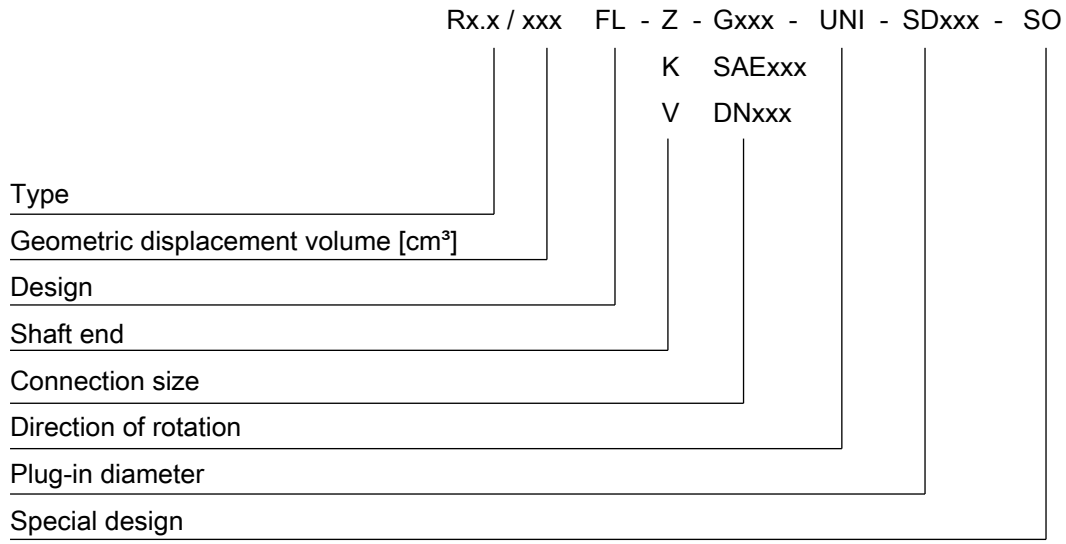


Fig. 9: Type key

7.2 Pump selection

The following selection tables allow you to configure the desired pump design by ticking options. The completed sheets can be sent to us together with your request.

For many applications, the **bolded** standard versions are sufficient. For further information on the listed options and variants, please contact us.

The gear pumps can naturally also be designed with our support. In that case, please contact us; please use the table in the following chapter "Pump design."

7.2.1 Size (type)/geometric displacement volume Vg

R4.5	☐ 35	☐ 39	☐ 45	☐ 54	☐ 63
R6.0	☐ 80	☐ 100	☐ 125	☐ 160	

→ Please select a displacement volume V_g [cm³]!

7.2.2 Casing variant

☐ SAE	**Flange pump (SAE flange pattern)**
☐ G	Flange pump (threaded connection)
☐ SD	Plug-in pump
☐	Face mounting pump (without pipework)
☐	Other

→ Please select a design!

7.2.3 Drive concept / shaft end

☐	Z	**Cylindrical shaft end with fitted key**
☐	K	Tapered shaft end
☐	V	Gearing (DIN 5480)
☐		Other

→ Please select a shaft end!

7.2.4 Materials

Casing		**EN-GJL-250 (GG-25)**
O-rings	☐	**FKM**
	☐	Alternative: HNBR, EPDM, additional on request
Friction bearing	☐	**Composite bearing type P10/DU**
	☐	Alternative: friction bearings free of ferrous and non-ferrous metals, additional upon request
Coating	☐	**2-component paint, RAL 5002**
	☐	Alternatively: other colours, coating materials and structures available on request

→ Please select materials for O-rings, friction bearing and coating!

7.2.5 Additional options

☐	Attachment bearing/attachment bearing unit	For an increased radial load on the shaft journal
☐	Non-return valve in the pressure connection	For pressure-free reversal
☐	Noise optimisation	For flow media with increased air content

→ Please select additional optional versions! For further information and/or the coordination of design details, please contact us.

Further information on pump selection:

_____

_____

_____

7.3 Pump design

If you require a technical design from us or if you are planning for operation outside the limits specified in the following chapter, please send us the following data:

Desired delivery volume (constant):	l/min
Speed:	
– Constant	rpm
– min./max.	rpm
Inlet pressure (manometric):	
– Constant	bar
– min./max.	bar
Outlet pressure (manometric):	
– Constant	bar
– max.	bar
Environmental temperature:	
– Constant	°C
– min./max.	°C
Flow media temperature:	
– Constant	°C
– min./max.	°C
Kinematic viscosity:	
– Constant	mm²/s
– min./max.	mm²/s
Flow medium:	

Further information on pump design:

8 Technical data

8.1 Operational limits

The maximum permissible operating conditions for UNI pumps in the standard version are described in the following. Contact RICKMEIER whenever exceeding these specifications is necessary.

As a prerequisite for a long service life and maximum operational safety, the flow medium retains its lubricity and, if possible, is clean and non-corrosive, but is in any case free of hard admixtures.

Consideration must be given also to the following:

Properties		Min.	Max.
Flow medium	Kinematic viscosity	5 mm^2/s [1]	100000 mm^2/s [1]
	Degree of contamination (according to ISO 4406:1999, max.)		21/19/17
	Gas content (undissolved, max.)		10 vol. % [2]
	Temperature (FKM seals)	-40 °C	100 °C
Inlet pressure (constant pressure in accordance with DIN 24312) [3]		-0.5 bar [4]	0 bar

Tab. 4: Operational limits

[1] Depending on the application and operating conditions, lower and/or higher viscosities are possible, please contact us.
[2] Undissolved gas in the flow medium leads to increased noise emissions.
[3] Manometric
[4] Lower value for short periods possible (e. g. during start-up); please contact us.

8.2 Operating data

Size	Delivery volume	Maximum approved operating data		Guide values		
				See legend [1]		
		Operating pressure [2]	Speed	Flow medium	Power requirement	Sound pressure level [3]
	Vg $[cm^3]$	p [bar]	n [1/min]	Q $[dm^3/min]$	P [kW]	Lp(A) [dB(A)]
R4.5	35	25	2200	49	0.7	70
	39			54	0.8	
	45			63	0.9	
	54	25	2200	76	1.1	67
	63			89	1.2	
R6.0	80	25	2200	113	1.6	76
	100			141	2.0	
	125	25	2200	176	2.5	72
	160			226	3.2	

Tab. 5: Technical data

[1] Speed = 1450 rpm, viscosity = 33 mm^2/s, operating pressure = 5 bar
[2] Avoid high operating pressures at low speed. In rated operation, the pressure on the outlet side of the gear pump must be at least 1 bar (manometric). Please contact us to determine the permissible minimum speed for your application.
[3] The specified sound pressure level values apply to cavitation-free operation of the UNI pump on the test stand (distance to the pump: 1 m).

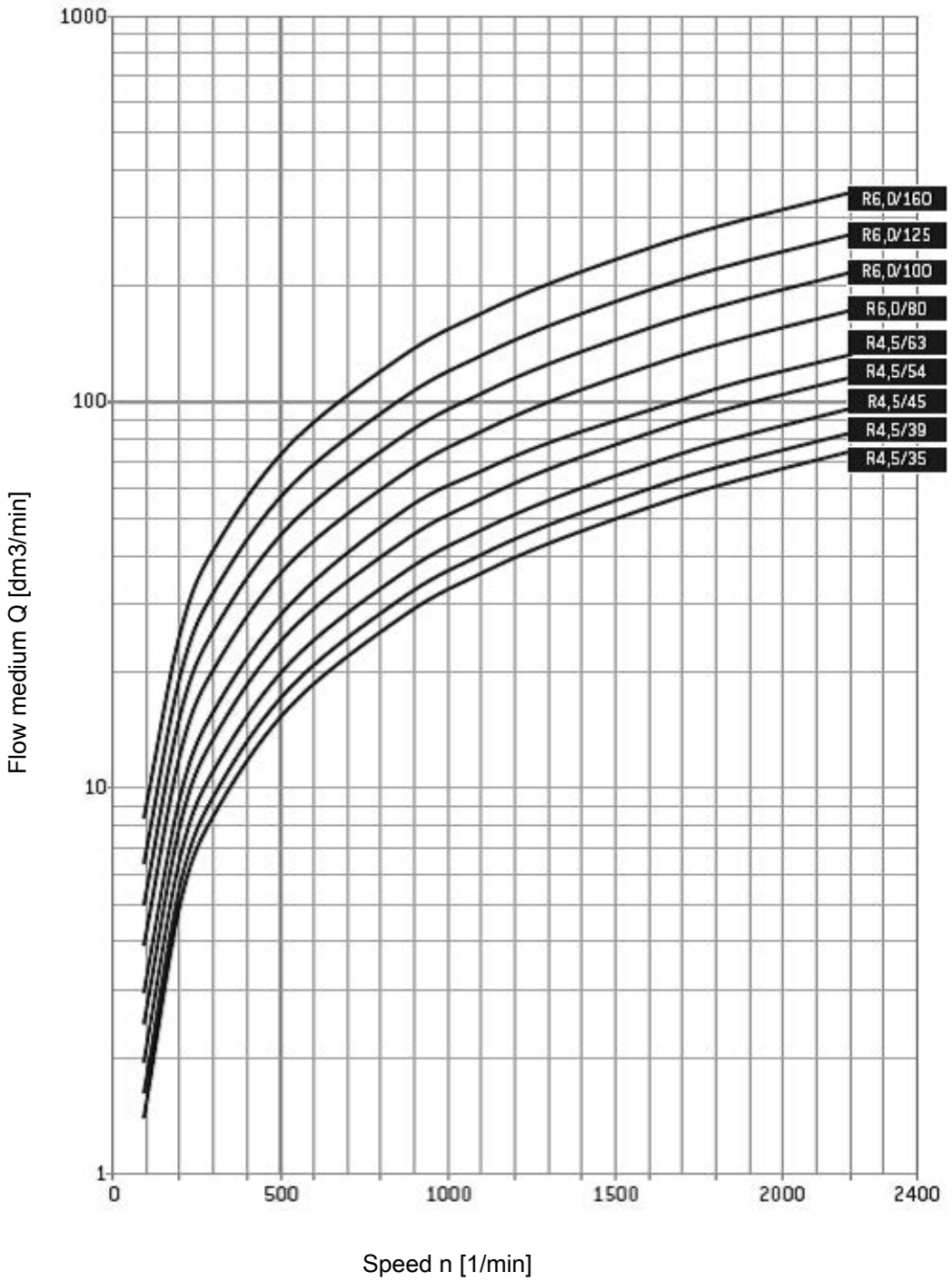
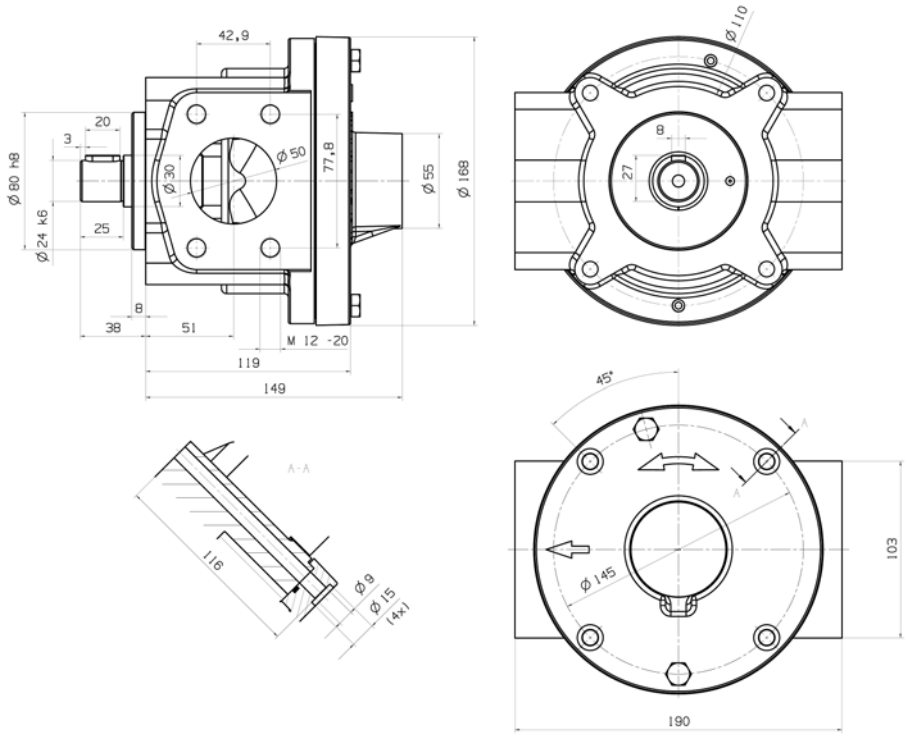


Fig. 10: Flow rate versus speed (values apply for kinematic viscosity = 100 mm²/s and outlet pressure p_2 = 12 bar)

9 Dimensional sheets, UNI pumps

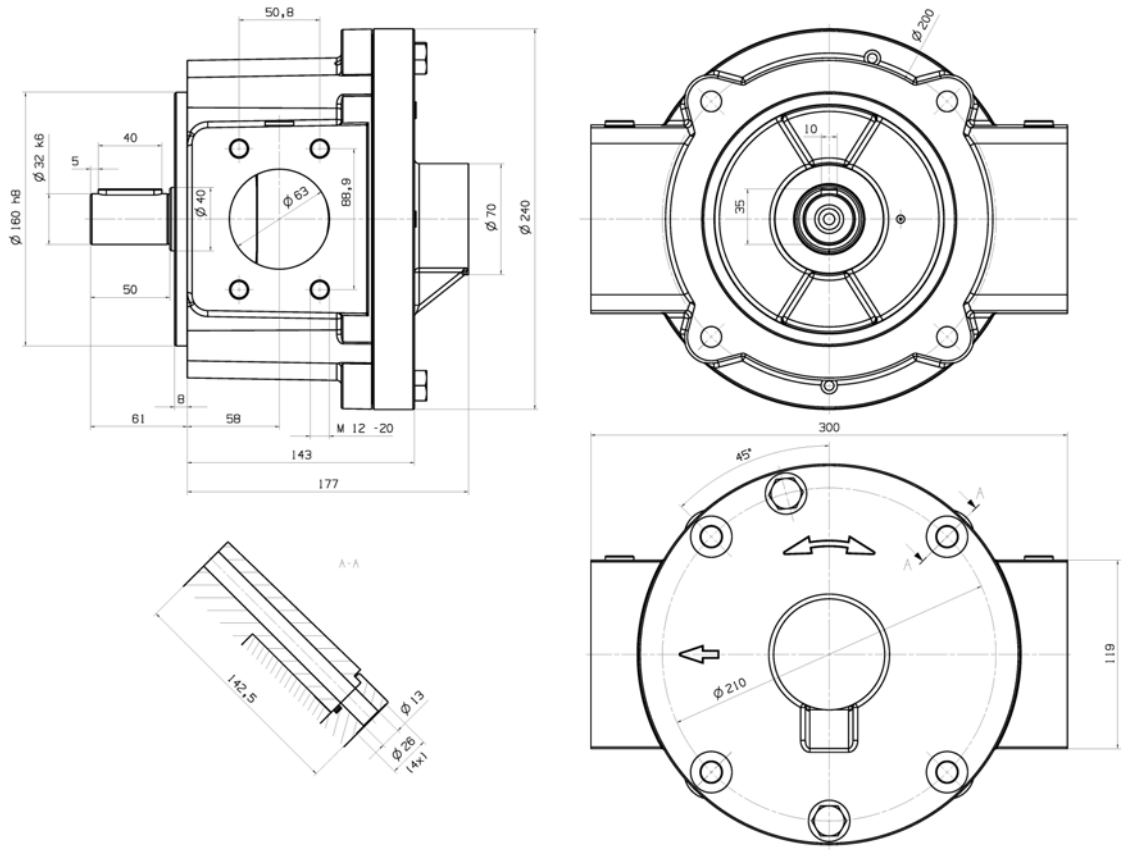
The following pages contain dimensions of the UNI pumps in the basic version. If you have questions about the design or special designs, please contact us.

9.1 Size R4.5



Displacement volume [cm³]	35 / 39 / 45 / 54 / 63
Weight [kg]	approx. 16
Flange size, suction and pressure connection	SAE 2

9.2 Size R6.0



Displacement volume [cm³]	80 / 100 / 125 / 160
Weight [kg]	approx. 40
Flange size, suction and pressure connection	SAE 2.1/2