

TOEG Series

Heat transfer pumps

for heat transfer oils from - 10 °C up to 350 °C and hot water up to 160 °C

with uncooled mechanical seals

bearing brackets 360 and 470

Pumps for heat transfer technology

Main applications

- » Tempering in plastics and die cast industry
- » Baking ovens, large frying units as well as in the production of edible oils and dry masses for the food and feedstuff industries
- » Heating calenders and melting pots in the leather and rubber industry
- » Heating stirring and mixing vessels in the production of paints and varnishes
- » Heating tank storage facilities on stationary and FPSE platforms as well as in tankers
- » Heating press lines in the wood and pulp industry
- » Flat glass production
- » Solar power stations and ORC processes

Usage

These pumps are designed for circulating organic or synthetic heat transfer oils in heat transfer plants in acc. with DIN 4754, as well as hot water.

Suitable for media to be pumped with little non-abrasive contaminations

	Thermal oil versions	Hot water versions
Media	Heat transfer oil / thermal oil	Water
T_{\min}	- 10 °C	-
T_{\max}	+ 350 °C	+ 160 °C, + 180 °C on request
Casing	Spheroidal graphite cast iron	
Nominal pressure	PN 16	
H_{\max} (2900 min ⁻¹)	100 m	
Q_{\max} (2900 min ⁻¹)	550 m ³ /h	
ATEX	II 3G, II 3D, II 2G, II 2D	

Denomination

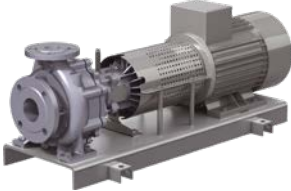


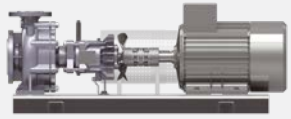
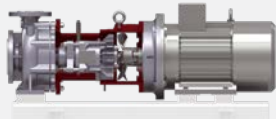
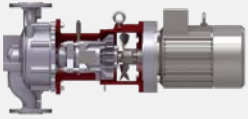
Type code Example	TOE	G	A	32	160	/150
Denomination of series						
Mechanical seal						
N = Version with bearing bracket, volute casing ax/top A = Close-coupled version with bracket, volute casing ax/top I = Close-coupled version with bracket, inline casing						
Nominal width of outlet nozzle DN						
Nominal impeller diameter in mm						
Actual impeller diameter in mm						

Your contacts

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International representatives
→ page 21

TOEG Series

	TOEGN	TOEGA	TOEGI
	 <p>Example: Casing with feet</p>	 <p>Example: Casing with centreline mounting</p>	 <p>H</p>
			
Features	<ul style="list-style-type: none"> » Bearing bracket / process design » Base plate » Dismantling of the bearing bracket without moving the motor is possible with optional spacer type coupling » Alignment / checking of the coupling required before start-up » Pump and aggregate dimensions in acc. with EN 733 	<ul style="list-style-type: none"> » Bracket version » Base plate optional » No alignment of coupling required before start-up » Space for disassembling the cartridge insert required » Pump dimension in acc. with EN 733 	<ul style="list-style-type: none"> » Bracket version with inline casing » No alignment of coupling required before start-up » Space for disassembling the cartridge insert required
Pump dimensions	→ Pages 16 and 17	→ Pages 16 and 17	→ Page 18
Hydraulics and casing	<ul style="list-style-type: none"> » Identical hydraulics for TOEGN and TOEGA » Characteristic curves → pages 12 and 13 » Identical volute casing for each frame size » Large pumps with centreline mounting and double volute » Description → page 5 		<ul style="list-style-type: none"> » Characteristic curves → pages 14 and 15 » Inline casings with two dimensions H available
Sizes	<ul style="list-style-type: none"> » Only two bearing brackets for all sizes » Bearing bracket 360 for 12 sizes - identical and interchangeable » Bearing brackets 470 for 7 sizes - identical and interchangeable » Only one bracket per size 		
Description	<ul style="list-style-type: none"> » Thermal oil versions → page 6 » Hot water versions → page 7 		
Interchangeability of parts	<ul style="list-style-type: none"> » Within all series including the versions with magnetic coupling (→ see catalogue TOEMN/MA/MI series) there is a high degree of interchangeability. » This means minimum spare parts stock and full flexibility as replacing pumps or components or retrofitting to a different design is very easy. » Table of interchangeable parts → page 19 		

High operational safety, optimal design and service-friendly

Robust design

Torsion-resistant casing cover and ball bearings with lifetime lubrication

Wear-resistant SiC sleeve bearings

Solid, hydrodynamically lubricated sleeve bearings made from SiC as tried-and-tested slide material - extremely wear-resistant and good resistance in corrosive media.

Impellers with back vanes

The back vanes of the impellers significantly reduce the axial thrust and therefore remove strain from the mechanical seal and the ball bearings considerably. They also keep dirt particles away from the sleeve bearings.

Optimised for synthetic heat transfer oils

Dry-run safety function for the mechanical seal

Synthetic heat transfer oils are being used more and more frequently due to the benefits they offer. However, low-boilers develop in the synthetic oils over time in form of gas bubbles, can lead to dry-running on the mechanical seal.

This is ruled out completely in the generously designed mechanical seal casings from Speck. An anti-vortex rib reliably prevents gas bubbles from forming on the mechanical seal.

The vacuum generated by the back vanes also ensures that the low-boilers do not collect in the mechanical seal casing and are returned to the media circuit.

Clever temperature management

Optimised cooling of ball bearings, mechanical seal and sleeve bearings

The air flow generated by the fan blade on the coupling cools the mechanical seal and the ball bearing optimally in combination with coupling protection or bracket and several cooling fins. The additional cooling zone reduces the temperature on the sleeve bearings.

Also suitable for critical applications

Mechanical seal with quench

For media, which are prone to crack product formation on the sealing surfaces of the mechanical seal, versions with quench are available.

ATEX

All pumps of the TOEG and TOEM series are ATEX certified.

Optimal design

Energy efficiency

High energy efficiency secures a lasting competitive edge.

Speck offers the important criteria for energy-optimised design: Seamless range of sizes, highly efficient impellers, switching of impellers for the best design at the operating point and natural motors in accordance with IE2.

Maintenance-friendly and flexible

Simple installation

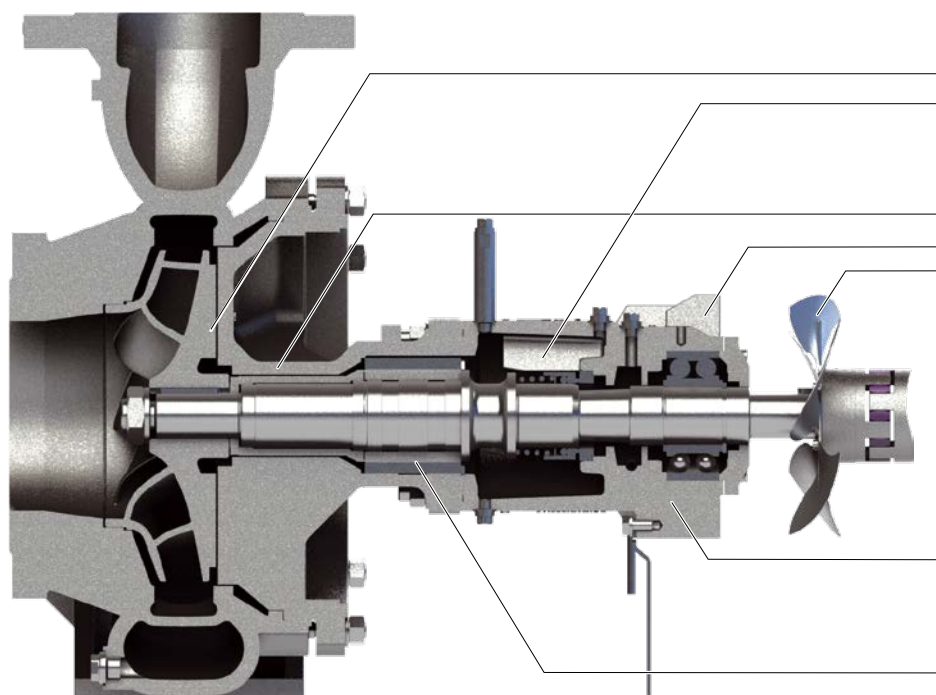
All series are extremely maintenance-friendly thanks to easy-to-remove bearing brackets.

Minimum spare parts stock

The high level of interchangeability of identical parts guarantees minimal spare parts stock requirements and an extremely high level of flexibility.

The bearing bracket 360 alone is used with mechanical seal in all three series in up to twelve sizes.

Retrofitting to a different series is also no problem at all - the volute casing can even be left in the system.



Dry-run safety function

Back vanes
Anti-vortex rib

Temperature management

Cooling zone
Cooling fins
Fan blades

Robust

Double-row angular ball bearings
from bearing bracket 470

Robust

Solid sleeve bearing made from SiC

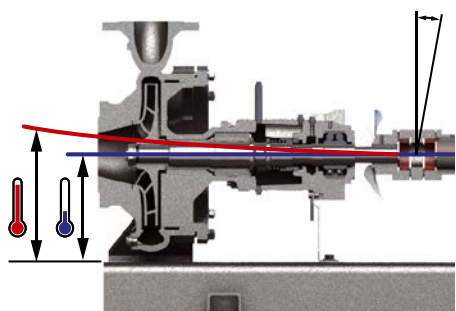
Fig.: TOEGN, bearing bracket 470, casing with centreline mounting

Longer lifetime

There are effects, which have little or no relevant impact on smaller designs, but lead to increased wear in larger pumps.

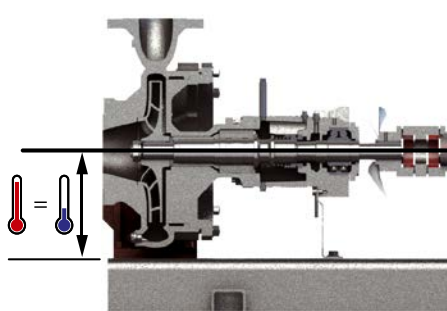
Speck offers larger pumps with special designs to guarantee a longer lifetime: Casing with centreline mounting and double volute.

Centreline mounting relieves strain from the bearings and coupling



Casing with feet: The larger the pump, the more strain placed on the bearings and coupling by heat expansion

Casings with feet can only expand upwards in high temperatures, which causes the shaft to tilt and bend. This has an impact on the sleeve bearings and shaft coupling in particular. As the heat expansion increases with larger casing size, the sleeve bearings and couplings also wear faster on larger pumps.



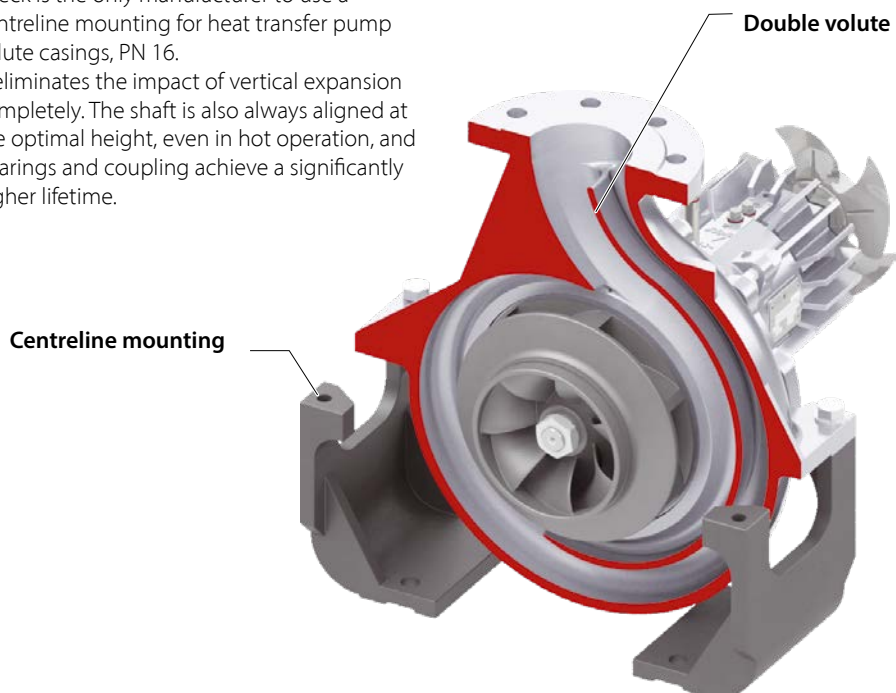
The centreline mounting eliminates the impact of the heat expansion completely

Speck is the only manufacturer to use a centreline mounting for heat transfer pump volute casings, PN 16. It eliminates the impact of vertical expansion completely. The shaft is also always aligned at the optimal height, even in hot operation, and bearings and coupling achieve a significantly higher lifetime.

A double volute remove strain from the sleeve bearings

Radial forces are applied directly on the sleeve bearings. The forces increase with higher impeller diameters and higher speeds. This is why the sleeve bearings on larger pumps with single volute casings wear faster.

Speck therefore uses casings with double volute for larger pumps, which significantly reduce the radial forces. The strain on the radial and axial bearings is considerably reduced, helping them achieve a much longer lifetime.

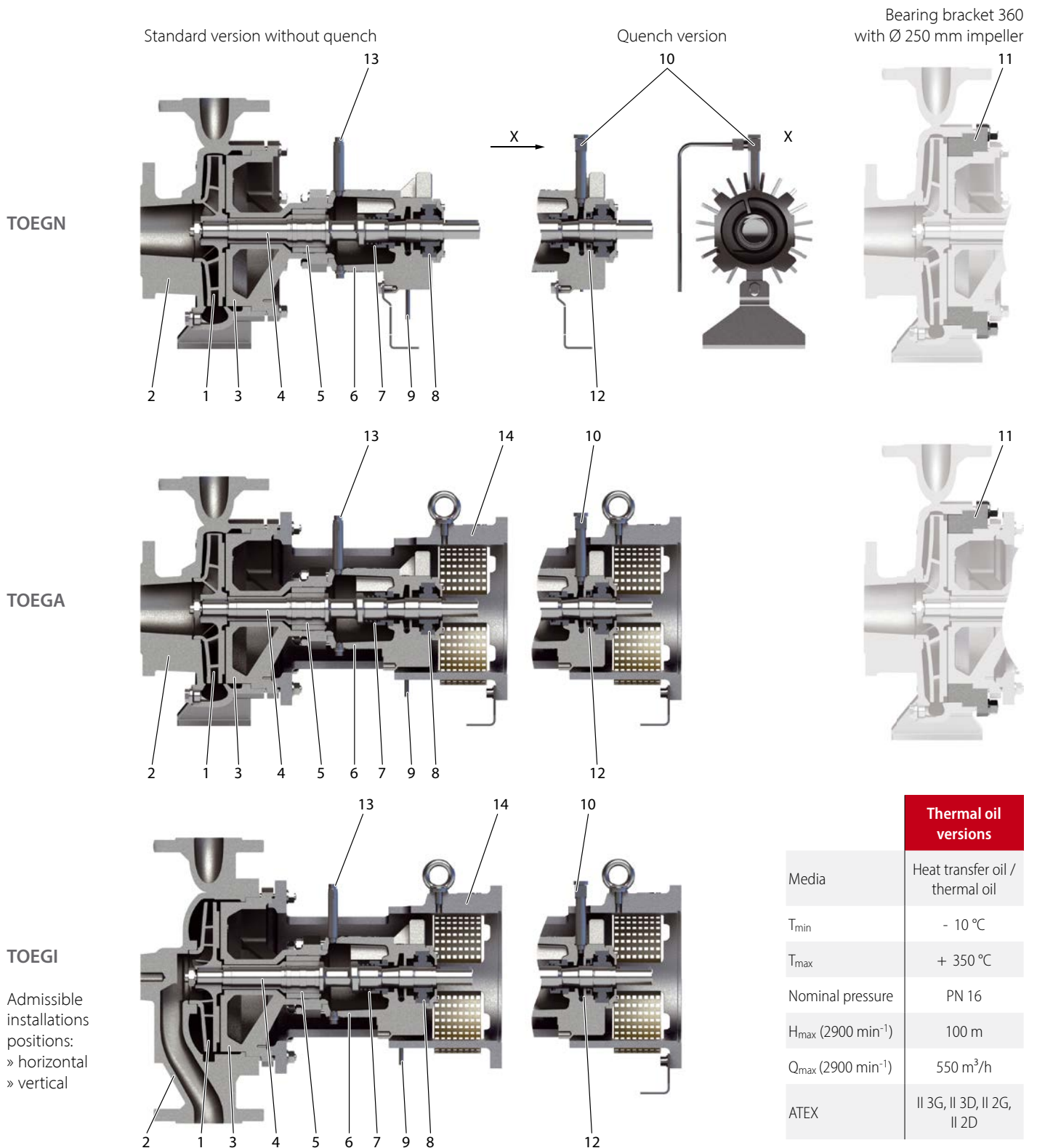


TOEGN / TOEGA – Sizes and casing designs

32-160	40-160	50-160	65-160	80-160	100-160	–
32-200	40-200	50-200	65-200	80-200	100-200	125-200
32-250	40-250	50-250	65-250	80-250	100-250	–
Bearing bracket 360			Bearing bracket 470			

All casings with dimensions in accordance with EN 733 Casing with double volute Casing with centreline mounting

Thermal oil versions

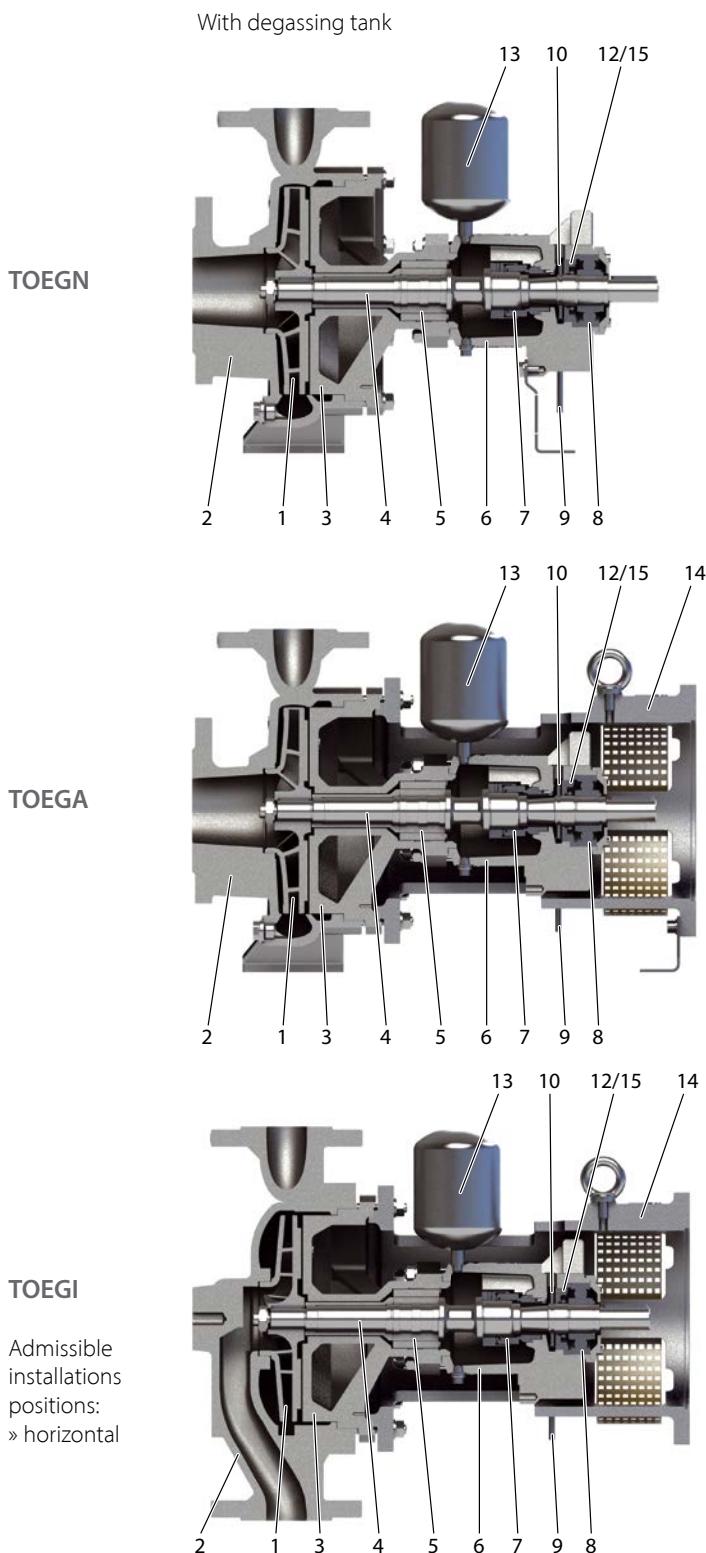


No.	Description	Material / Remarks
1	Impeller	EN-GJL-250
2	Casing	EN-GJS-400-15
3	Casing cover	EN-GJS-400-15
4	Shaft	1.4122
5	Sleeve bearing	SiC
6	Mechanical seal casing	EN-GJS-400-15
7	Mechanical seal	AQ1VGG, unbalanced
8	Rolling bearing	High-quality brand

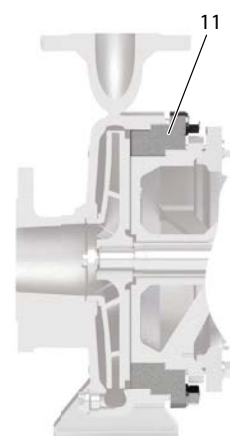
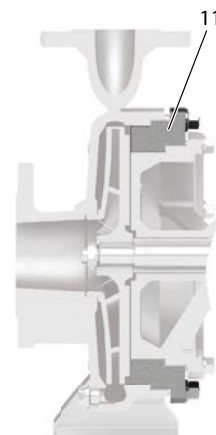
No.	Description	Material / Remarks
9	Leakage pipe	not applicable to quench version
10	Quench reservoir	optional
11	Counter flange	EN-GJS-400-15
12	Radial shaft sealing ring	only available with quench version
13	Ventilation	
14	Bracket	EN-GJS-400-15

EN-GJL-250 = GG-25
EN-GJS-400-15 = GGG-40

Hot water versions



Bearing bracket 360
with Ø 250 mm impeller



	Hot water versions
Media	Water
T_{min}	-
T_{max}	+ 160 °C, + 180 °C on request
Nominal pressure	PN 16
H_{max} (2900 min ⁻¹)	100 m
Q_{max} (2900 min ⁻¹)	550 m ³ /h
ATEX	II 3G, II 3D, II 2G, II 2D

No.	Description	Material / Remarks
1	Impeller	EN-GJL-250
2	Casing	EN-GJS-400-15
3	Casing cover	EN-GJS-400-15
4	Shaft	1.4122
5	Sleeve bearing	SiC
6	Mechanical seal casing	EN-GJS-400-15
7	Mechanical seal	AQ;KGG, balanced
8	Rolling bearing	High-quality brand

No.	Description	Material / Remarks
9	Leakage pipe	
10	Splash ring	
11	Counter flange	EN-GJS-400-15
12	Radial shaft sealing ring	
13	Degassing tank	
14	Bracket	EN-GJS-400-15
15	Bush	

EN-GJL-250 = GG-25 | EN-GJS-400-15 = GGG-40

Order-related tests

Pressure tests

Speck carries out the tests below as standard:

Gas pressure test

The gas pressure test is used to prove that the components are leak-proof. All components that bear pressure are tested, such as the volute casing, casing cover and mechanical seal casing. The test is carried out with forming gas at 2 bar. The holding time is 15 minutes.

Hydrostatic pressure test

The hydrostatic pressure test is used to prove strength of the components and that the pump is leak-proof. The fully assembled pump is tested. The test is carried out with a hydrostatic test pressure based on prEN 12162; the hydrostatic test pressure corresponds to 1.5 x the nominal pressure (PN16) at 20 °C. The holding time is 10 minutes.

If you want to use pressure tests according to different criteria, please enter them in the request.

Testing the performance

At the customer's request, Speck offers the following tests:

Hydraulic test

Measurement according to EN ISO 9906, Class II

NPSH test

In this test, the suction-side pressure is gradually reduced until the decrease in the delivered head reaches 3 % at a constant flow rate. At least four flows are evaluated that are spread appropriately over the admissible operating range. The NPSH value is not a guarantee point.

Vibration test

Vibration test according to EN ISO 5199, Edition 2002

The vibration values are measured radially and vertically at every operating point on the bearing casing at the nominal speed and with the corresponding flow rate.

Temperature measurement

The measurement is taken on the motor-side bearing at operating temperature. The operating temperature and the ambient temperature at every operating point measured are documented.



Computer-controlled and fully automated test stands on the premises of Speck in Roth.

Measuring of hydraulics, power requirements, axial thrust, vibrations and NPSH values. Heads of up to 400 m and flow rates of up to 750 m³/h are possible.

Further data and notes

Standard conditions at site

- » Ambient temperature from -20 °C to +40 °C
- » Permissible altitude up to 1000 m above seal level

Deviations from the site conditions specified herein must already be disclosed in the inquiry.

Painting

The pumps are coated with highly heat-resistant white aluminium paint, colour code RAL 9006.

Dimensioning

Assessment of the maximum pump outlet pressure

The pump outlet pressure at the pump nozzle depends on

- » the pump inlet pressure
- » the maximum total head of the selected impeller diameter
- » the density of the medium to be pumped

The maximum pump outlet pressure $p_{2\max\text{ op}}$ is calculated using the formula:

$$p_{2\max\text{ op}} = p_{1\max\text{ op}} + \rho \cdot g \cdot H \cdot 10^{-5}$$

With:

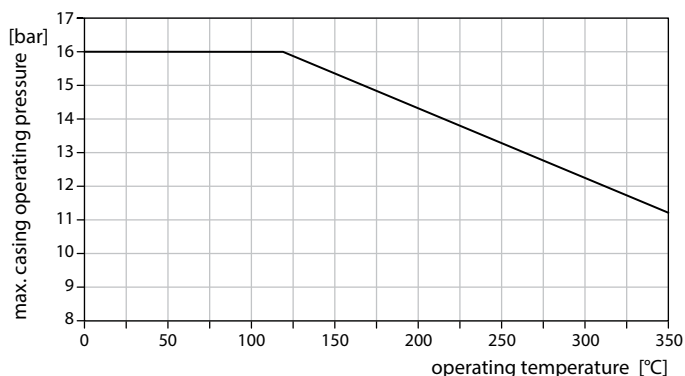
- $p_{2\max\text{ op}}$ = maximum pump outlet pressure [bar]
- $p_{1\max\text{ op}}$ = maximum pump inlet pressure [bar]
- ρ = density of the medium to be pumped [kg/m^3]
- g = gravitation constant [m/s^2]
- H = maximum total head at zero flow or at the peak of the pump's characteristic curve at the selected impeller diameter [m]

Pumps must be selected and operated in a way which ensures that the maximum pump outlet pressure does by no means exceed the maximum permissible operating pressure of the casing $p_{\text{all w c}}$ at operating pressure.

This also applies to commissioning while the discharge valve is closed (refer to diagram).

Pressure and temperature limitations

The maximum casing operating pressure $p_{\text{all w c}}$ of the pressure retaining parts depends on the operating temperature:



Maximum permissible casing operating pressure $p_{\text{all w c}}$

SPAIX selection program

Ideal for system planners

We make the program available to authorised customers who can pre-select the pumps within their system. The web-based software always accesses an up-to-date database.

Easy pre-selection

The configuration system avoids a wide range of selection parameters with regard to design, sealing systems, hydraulics, operating conditions and media.

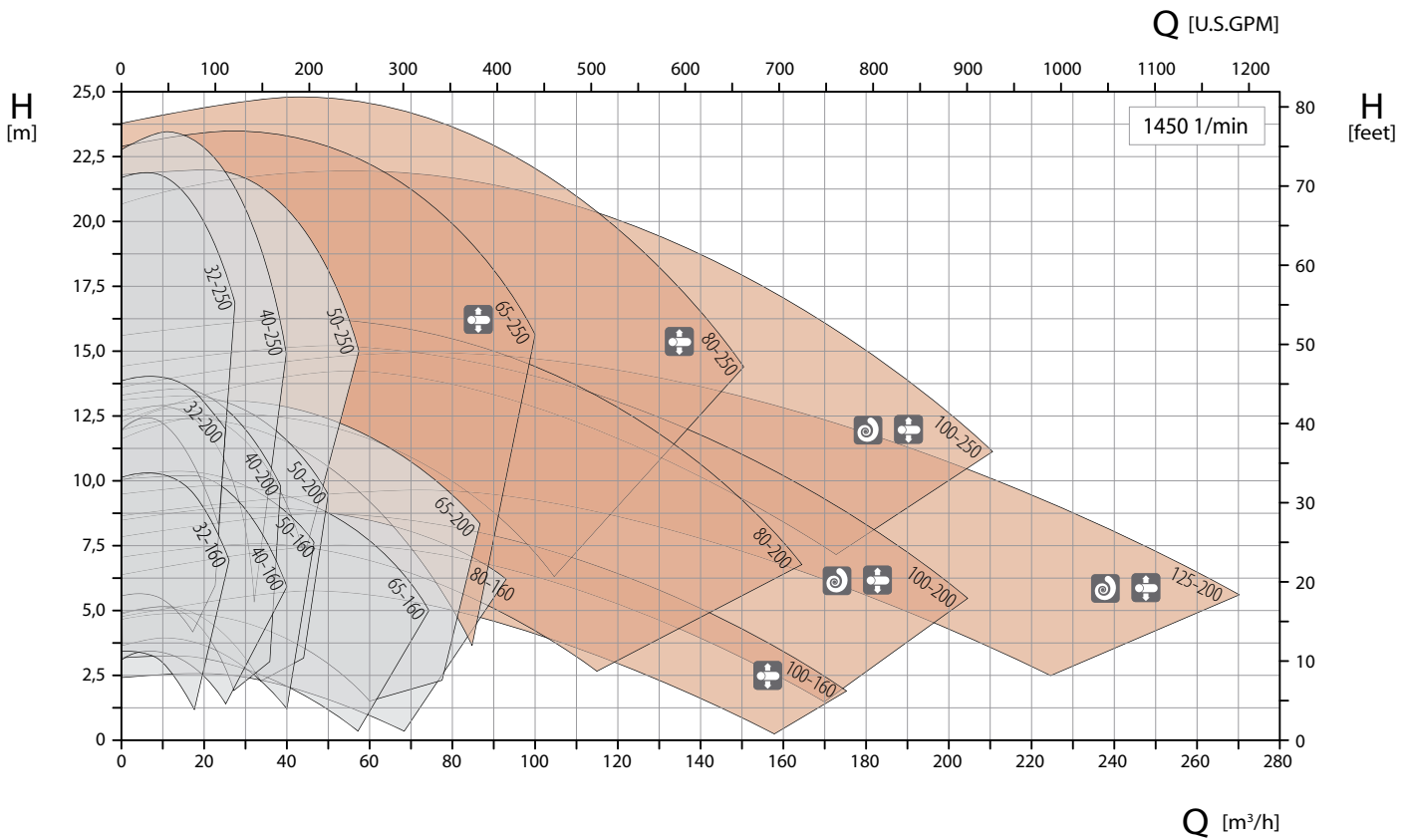
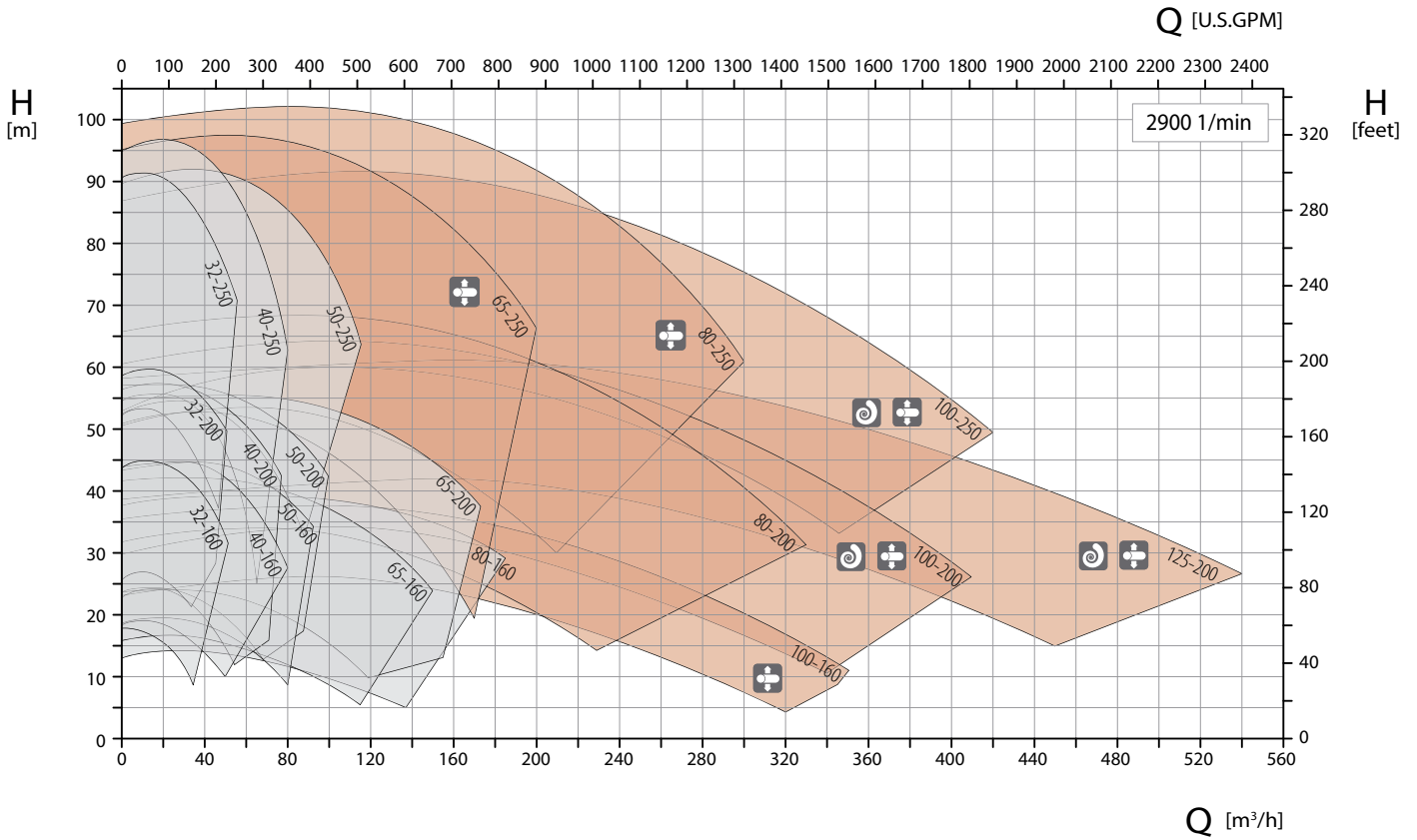
The software has language options for German and English.

Checking the pre-selection

When the order is submitted, the customer's choices are double-checked to ensure that your project requirements are met.

TOEGN / TOEGA – Characteristic curves

50 Hz



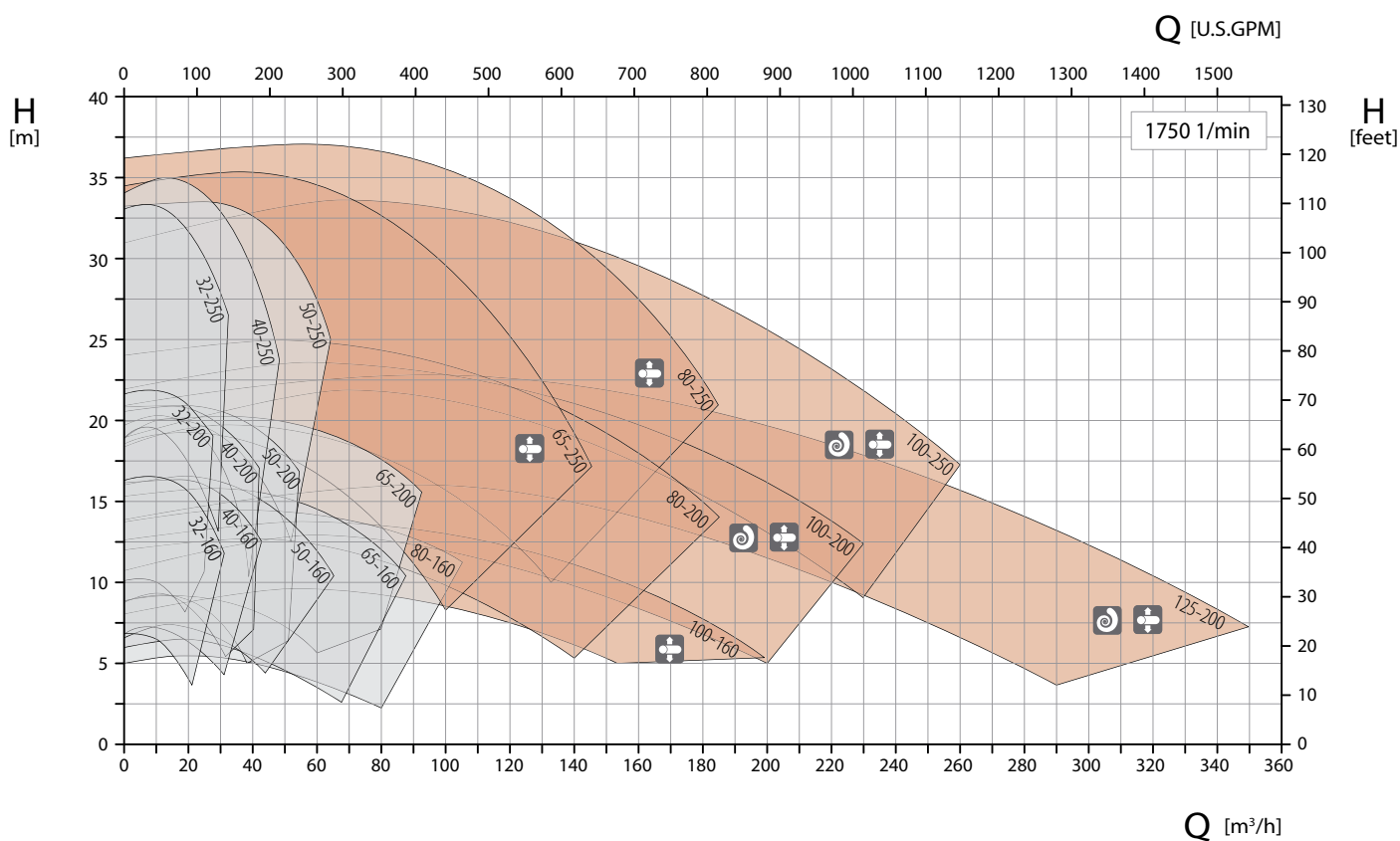
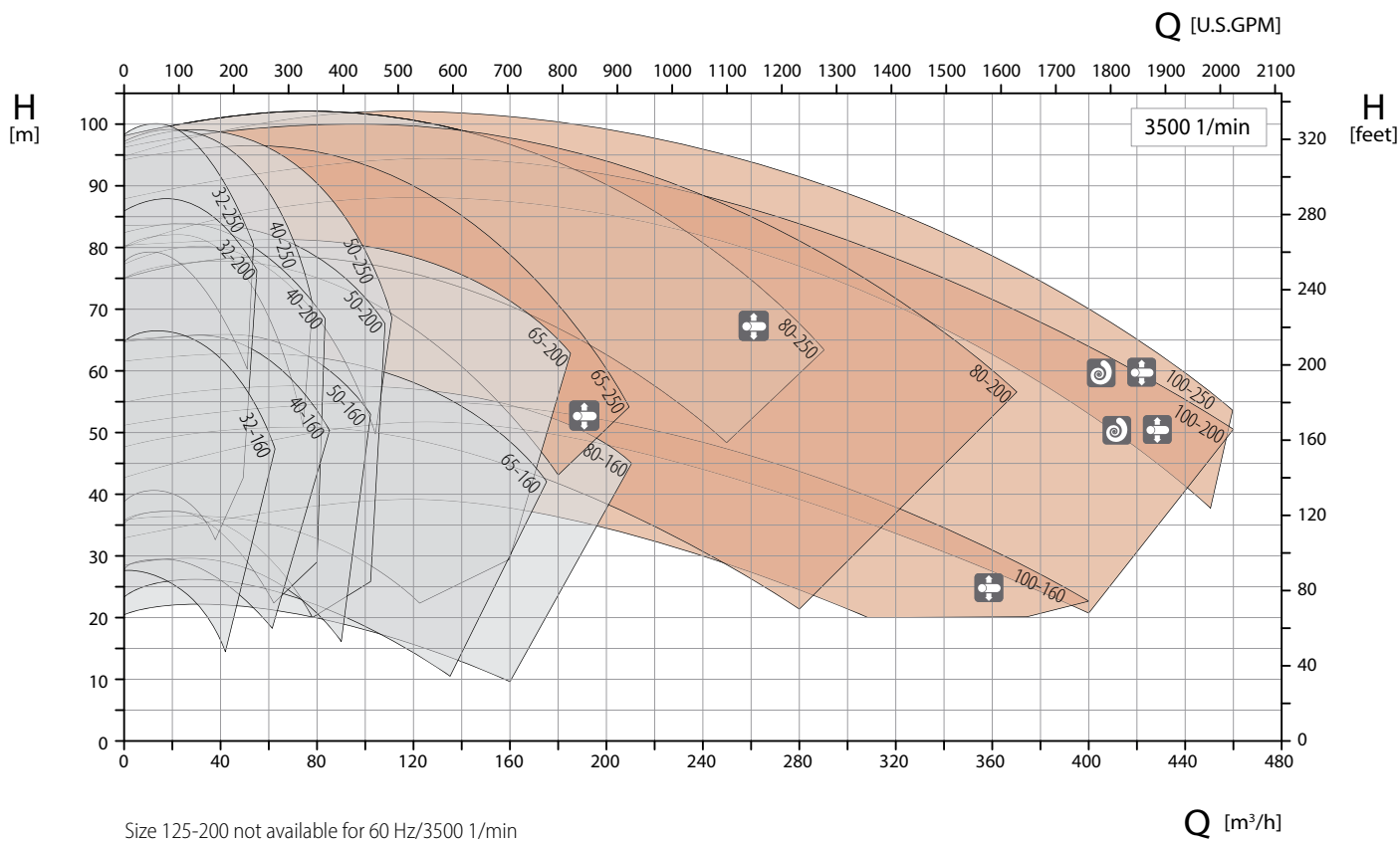
Bearing bracket 360

Bearing bracket 470

Casing with double volute

Casing with centreline mounting

60 Hz



Bearing bracket 360

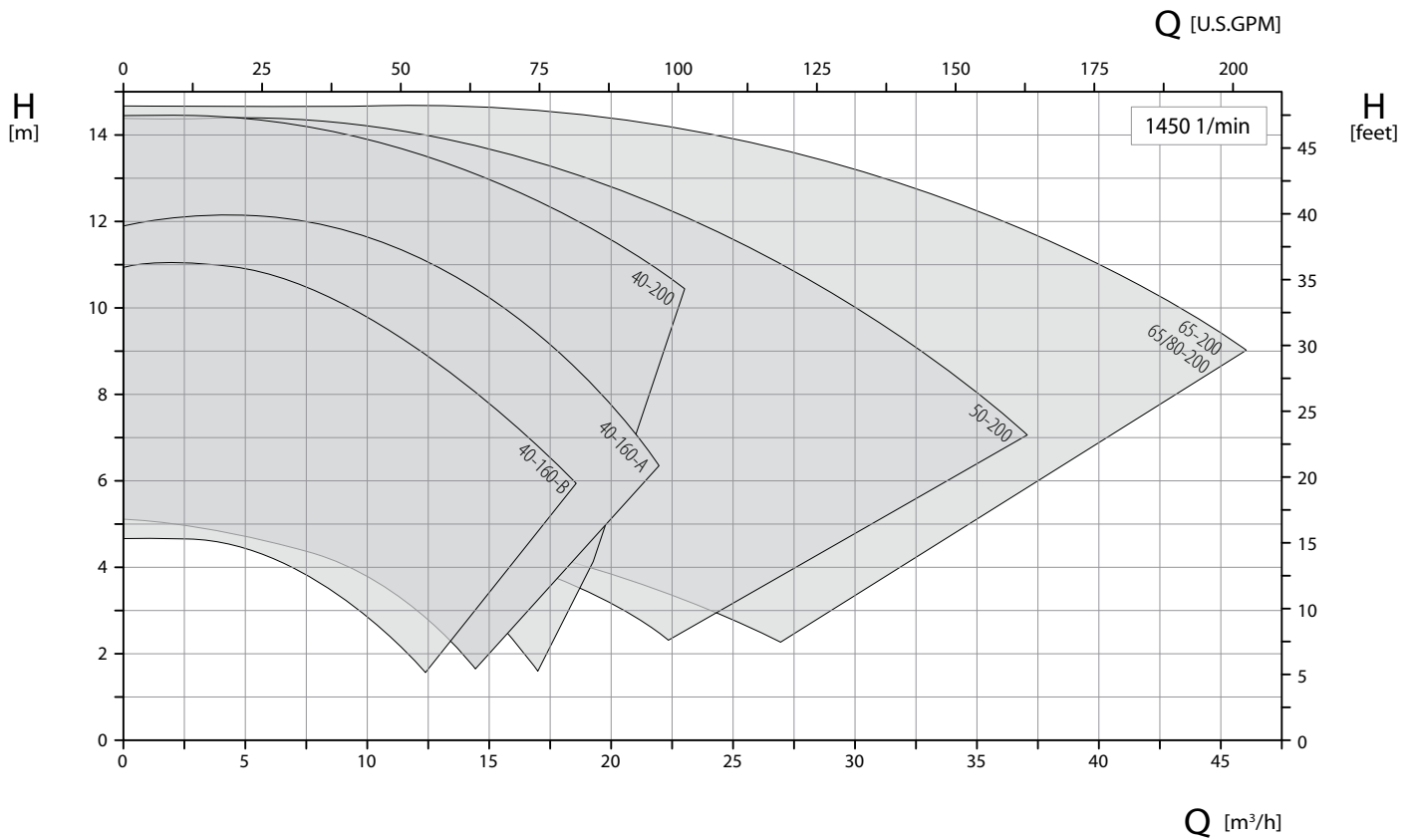
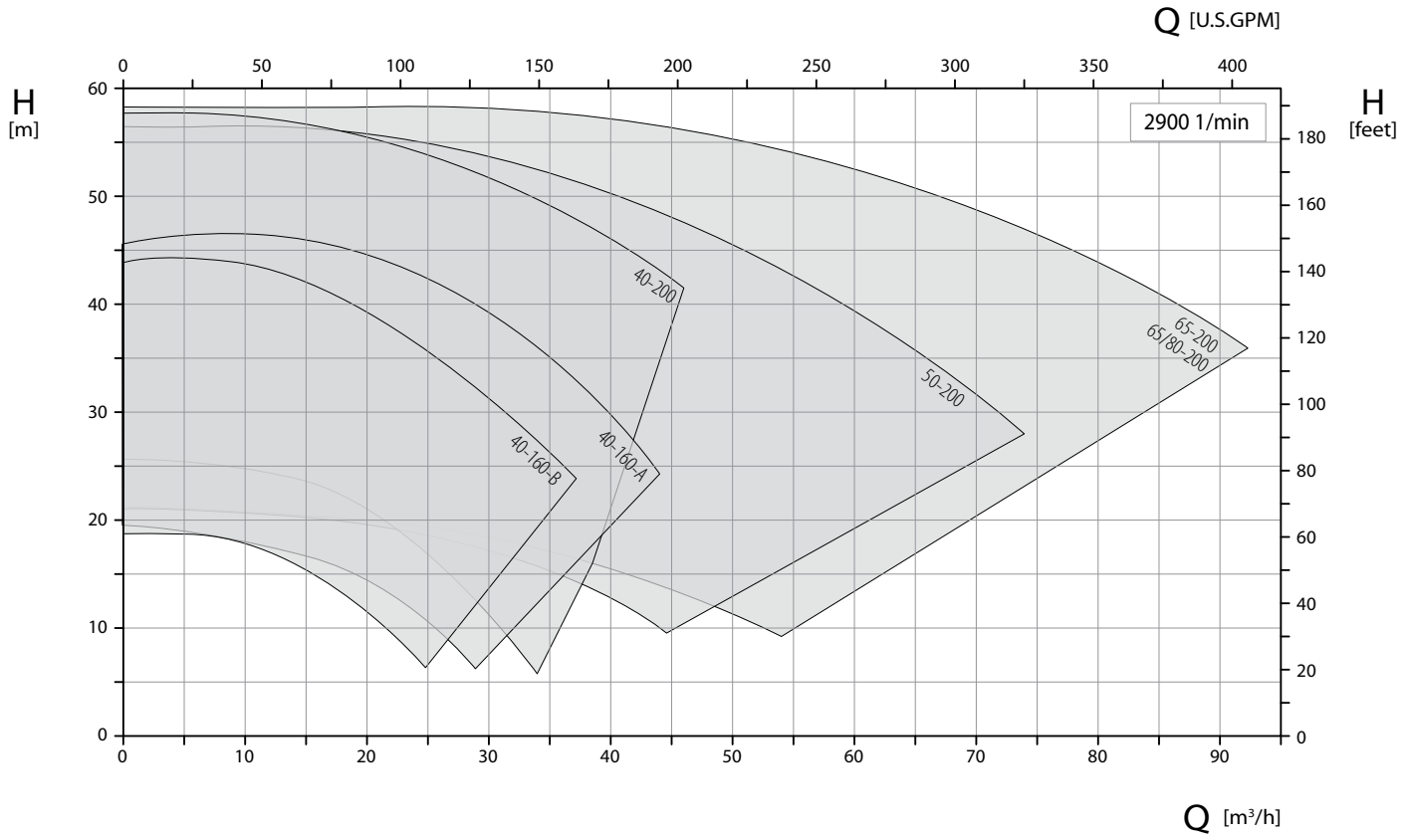
Bearing bracket 470

Casing with double volute

Casing with centreline mounting

TOEGI – Characteristic curves

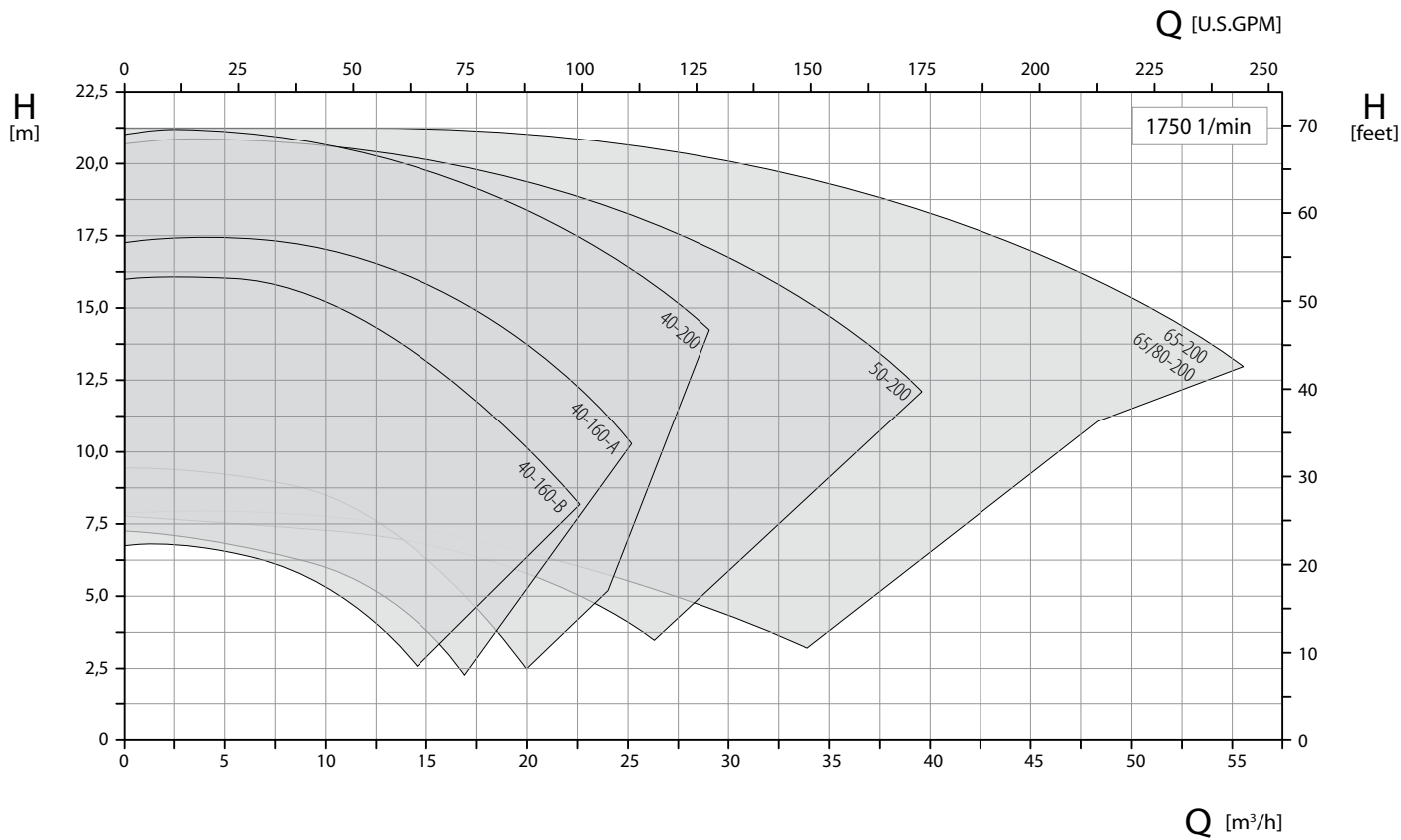
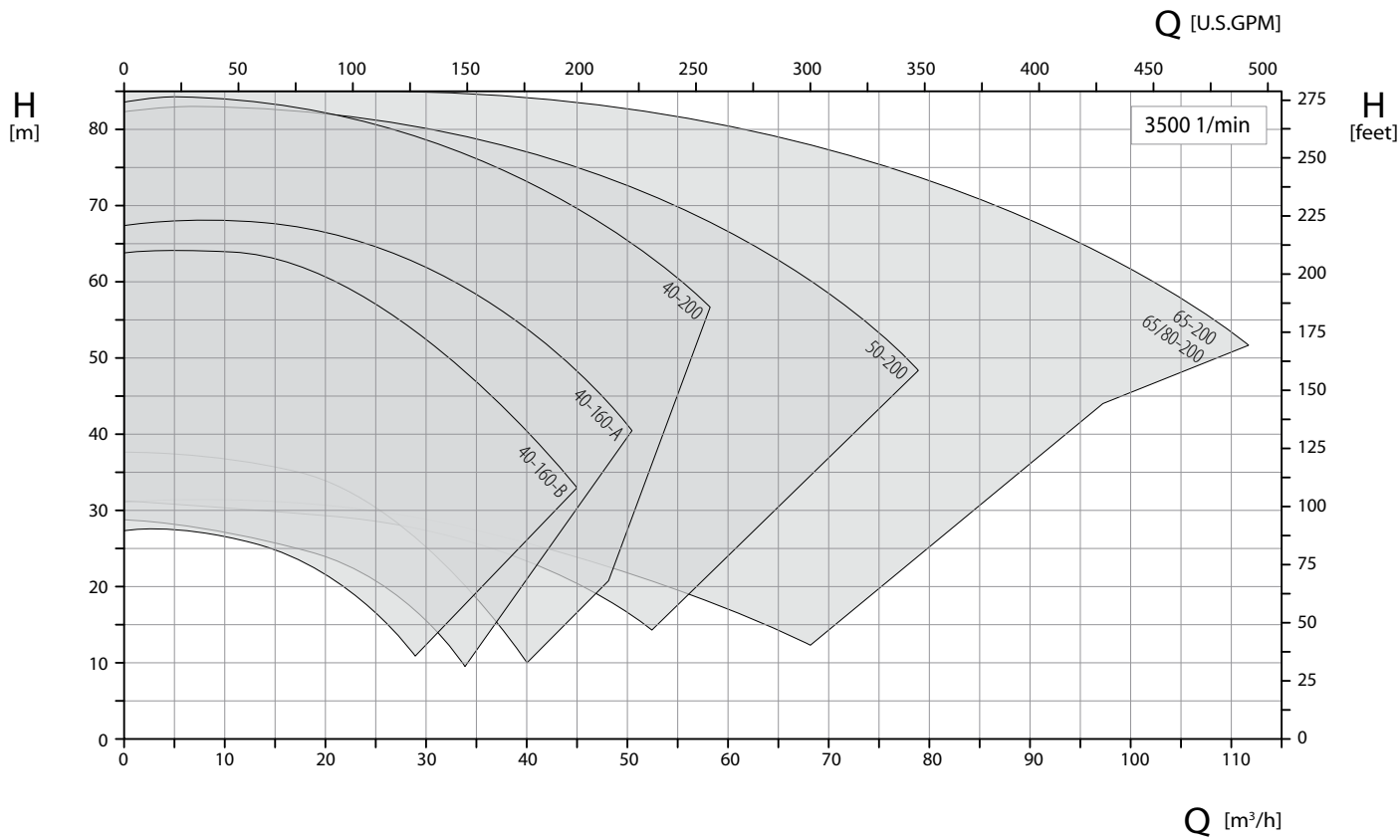
50 Hz



Bearing bracket 360

Size 40-160 with hydraulics A or B available

60 Hz



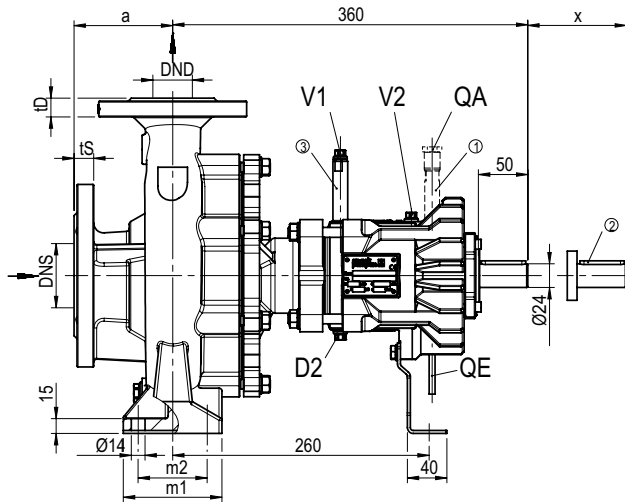
Bearing bracket 360

Size 40-160 with hydraulics A or B available

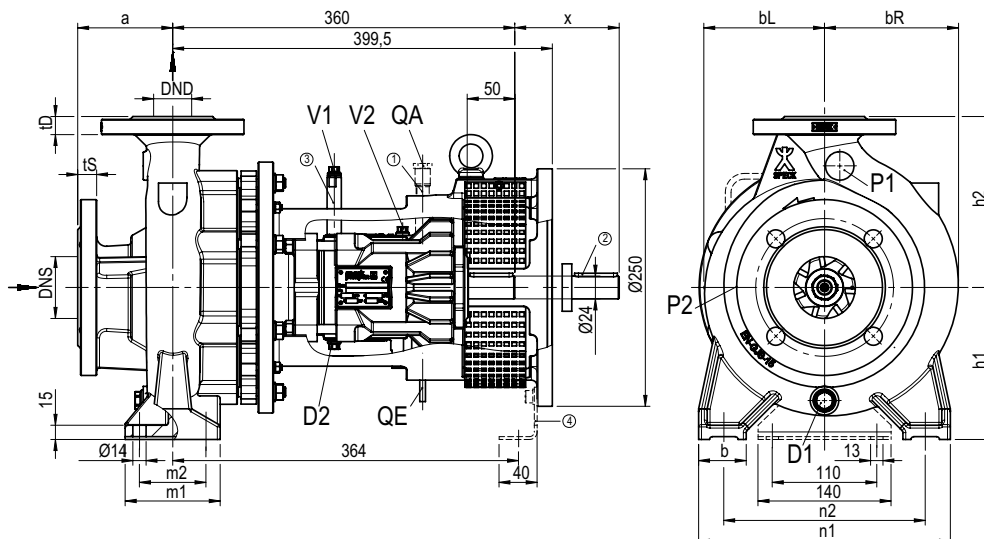
TOEGN / TOEGA – Dimensions and connections

Bearing bracket 360

TOEGN



TOEGA



Size	DNS	DS	tS	DND	DD	tD	a	bL	bR	h1	h2	b	m1	m2	n1	n2	x
32-160	50	165	20	32	140	15	80	116	121	132	160	50	100	70	240	190	110
32-200	50	165	20	32	140	18	80	123	135	160	180	50	100	70	240	190	110
32-250	50	165	20	32	140	18	100	152	163	180	225	65	125	95	320	250	110
40-160	65	185	20	40	150	18	80	123	129	132	160	50	100	70	240	190	110
40-200	65	185	20	40	150	18	100	127	141	160	180	50	100	70	265	212	110
40-250	65	185	20	40	150	18	100	151	160	180	225	65	125	95	320	250	110
50-160	65	185	20	50	165	20	100	123	136	160	180	50	100	70	265	212	110
50-200	65	185	20	50	165	20	100	130	148	160	200	50	100	70	265	212	110
50-250	65	185	20	50	165	20	100	157	170	180	225	65	125	95	320	250	110
65-160	80	200	22	65	185	20	100	124	151	160	200	65	125	95	280	212	110
65-200	80	200	22	65	185	20	100	136	164	180	225	65	125	95	320	250	110
80-160	100	220	24	80	200	22	125	139	174	180	225	65	125	95	320	250	110

Utility connections

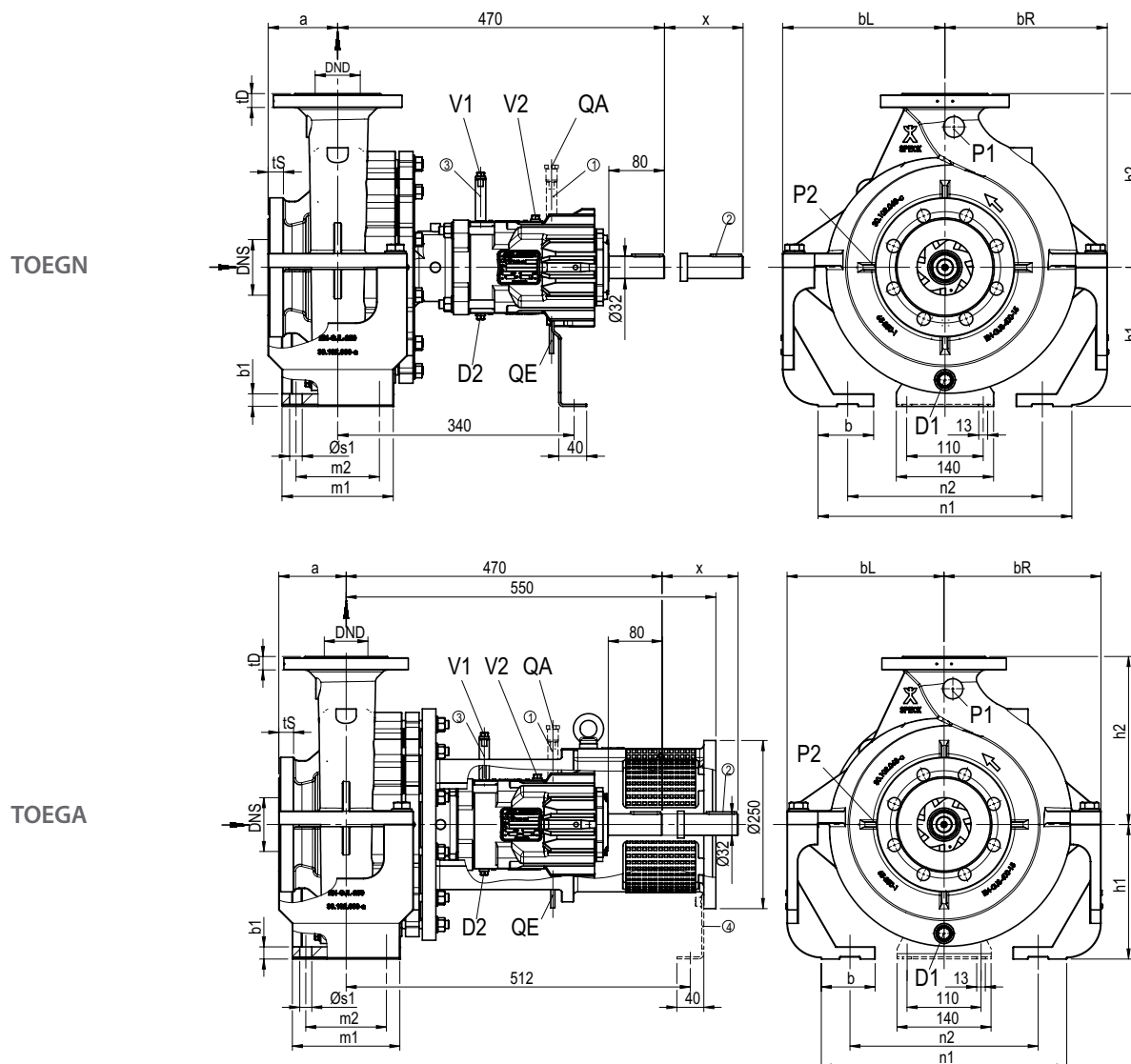
P1	G 1/4	Manometer connection pressure-side (without bore)
P2	G 1/8	Manometer connection suction-side (without bore)
V1	G 1/8	Ventilation mechanical seal casing (horizontal set-up), not applicable for hot water version
V2	G 1/8	Ventilation mechanical seal casing (vertical set-up), not applicable for hot water version
D1	G 3/8	Drainage volute casing
D2	G 1/8	Drainage mechanical seal casing
QE	G 1/8	Leakage evacuation mechanical seal
QA	G 1/8	Quench (optional)

- ① Quench optionally
 - ② Fitting key DIN 6885
 - ③ Venting pipe
 - ④ Feet applicable for motor design B5 only
- x = Dismantling dimension

Flange dimensions → page 16

TOEGN / TOEGA – Dimensions and connections

Bearing bracket 470



Size	DNS	DS	tS	DND	DD	tD	a	bL	bR	h1	h2	b	b1	m1	m2	n1	n2	øS1	x
65-250	80	200	22	65	185	20	100	233,5	233,5	200	250	80	18	160	120	360	280	18	140
80-200 ¹	100	220	24	80	200	22	125	162,5	191	180	250	65	15	125	95	345	280	14	140
80-250 ²	100	220	24	80	200	22	125	181	206,5	200	280	80	18	160	120	400	315	18	140
100-160	125	254	26	100	230	25	125	233,5	233,5	200	280	80	18	160	120	360	280	18	140
100-200 ³	125	254	26	100	230	25	125	233,5	233,5	200	280	80	18	160	120	360	280	18	140
100-250 ³	125	254	26	100	230	25	140	230	230	225	280	80	18	160	120	400	315	18	140
125-200 ³	150	285	26	125	254	26	140	262	262	250	315	80	18	160	120	400	315	18	140

¹ Casing with feet resp. without centreline mounting

² Casing with feet – as of 2015 with centreline mounting

³ Casing with double volute

Utility connections

P1 G 1/4 Manometer connection pressure-side (without bore)

P2 G 1/8 Manometer connection suction-side (without bore)

V1 G 1/8 Ventilation mechanical seal casing (horizontal set-up), not applicable for hot water version

V2 G 1/8 Ventilation mechanical seal casing (vertical set-up), not applicable for hot water version

D1 G 3/8 Drainage volute casing

D2 G 1/8 Drainage mechanical seal casing

QE G 1/8 Leakage evacuation mechanical seal

QA G 1/8 Quench (optionally)

① Quench optionally

② Fitting key DIN 6885

③ Venting pipe

④ Feet applicable for motor design B5 only

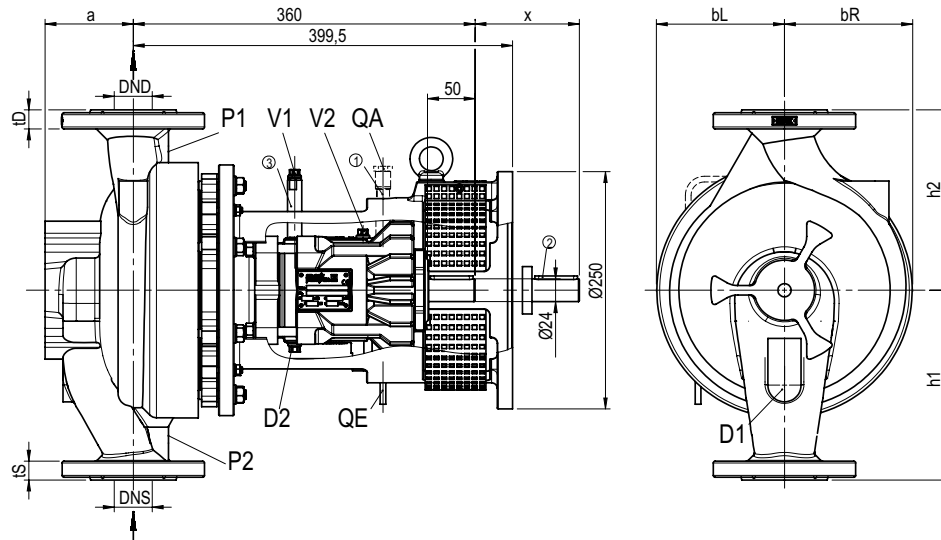
x = Dismantling dimension

Flange dimensions → page 16

TOEGI – Dimensions and connections

Bearing bracket 360

TOEGI



Size	Casing	DNS	DND	a	DD	DS	tD	tS	bL	bR	h1	h2	x
40-160	INA	40	40	97	150	150	20	20	116	116	200	190	110
40-160	INB	40	40	97	150	150	20	20	116	116	180	160	110
40-200	INA	40	40	93	150	150	20	20	135	135	200	190	110
50-200	INA	50	50	102	165	165	21	21	126	139	220	205	110
50-200	INB	50	50	92	165	165	21	21	126	139	200	180	110
65-200	INA	65	65	112	185	185	23	23	131	151	240	225	110
65/80-200	INB	80	80	112	200	200	23	23	131	151	255	225	110

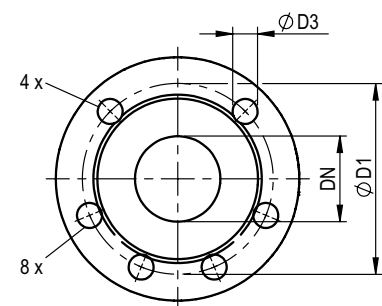
Anschlüsse

P1	G 1/4	Manometer connection pressure-side (without bore)
P2	G 1/8	Manometer connection suction-side (without bore)
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V2	G 1/8	Ventilation mechanical seal casing (vertical set-up), not applicable for hot water version
D1	G 3/8	Drainage volute casing
D2	G 1/8	Drainage mechanical seal casing
QE	G 1/8	Leakage evacuation mechanical seal
QA	G 1/8	Quench (optionally)

- ① Quench optionally
- ② Fitting key DIN 6885
- ③ Venting pipe
- x = Dismantling dimension

Flange dimensions

Flanges in acc. with DIN EN 1092-2				Flanges in acc. with DIN EN 1092-2, drilled in acc. with ANSI 150 lbs			
DN	øD1	øD3	Holes	DN	øD1	øD3	Holes
32	100	19	4	32	88,9	16	4
40	110	19	4	40	98,6	16	4
50	125	19	4	50	120,7	19	4
65	145	19	4	65	139,7	19	4
80	160	19	8	80	152,4	19	4
100	180	19	8	100	190,5	19	8
125	210	19	8	125	215,9	22	8
150	240	23	8	150	241,3	22	8



Interchangeability of parts

All series including the versions with magnetic coupling (→ brochure TOEMN/MA/MI series) offer a high degree of interchangeability.

Same components within TOEGN/GA/GI series

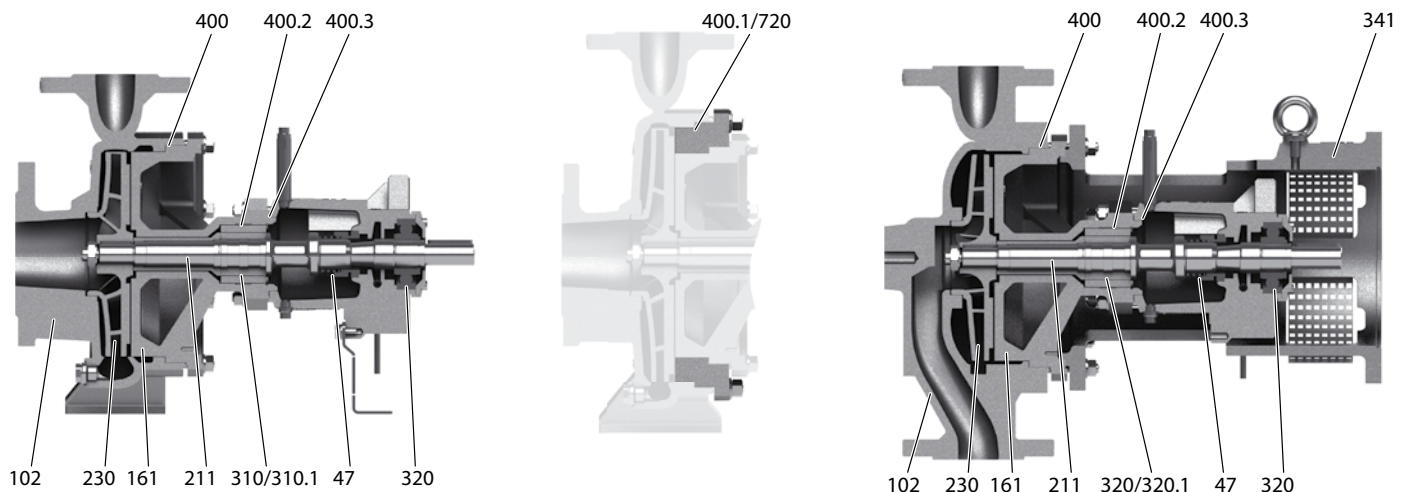
Compare only numbers within one **row**:

1 and 1 = same number means same component

1 and 2 and ... = different numbers mean different components

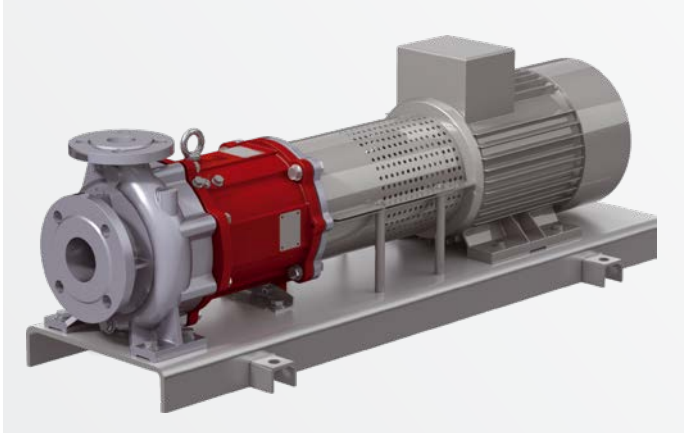
Component	No.	Series	Pump size																		
			32-160	32-200	32-250	40-160	40-200	40-250	50-160	50-200	50-250	65-160	65-200	80-160	65-250	80-200	80-250	100-160	100-200	100-250	125-200
Bearing bracket complete	–	GN GA GI	1	2	1	2	1	2	1	2	1	2	1	3	4	3	5	4	3	4	
Mechanical seal	47	GN GA GI	1												2						
Volute casing	102	GN GA –	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
		– – GI	20				21	22			23										
Casing cover	161	GN GA GI	1	2	1	2	1	2	1	2	1	2	1	3	4	3	5	4	3	4	
Shaft	211	GN GA GI	1												2						
Impeller	230	GN GA –	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
		– – GI	1				20	5			8										
Sleeve bearing	310 / 310.1	GN GA GI	1												2						
Ball bearing	320	GN GA GI	1												2						
Bracket	341	– GA GI	1												2						
Flat gasket	400	GN GA GI	1												2						
Flat gasket	400.1	GN GA –	1				1			1											
Flat gasket	400.2 / 400.3	GN GA GI	1												2						
Mechanical seal casing ¹	441	GN GA GI	1												2						
Counter flange	720	GN GA –	1				1			1											
further parts	–	GN GA GI	1												2						

¹ Thermal oil version and hot water version deviating



Pumps for heat transfer technology

Centrifugal pumps with magnetic coupling



Modular system

TOEM and TOEG series mean a consistent designed modular system. Hydraulics and the main part of the used components are identical and interchangeable.

TOEM Series

Developed for circulating organic or synthetic heat transfer oils in heat transfer systems in accordance with DIN 4754

Suitable for pumped media with low amounts of non-abrasive impurities

	Spheroidal graphite cast iron versions	Stainless steel versions
Media	Heat transfer oil / thermal oil	Heat transfer oil / thermal oil
T _{min}	- 40 °C	- 100 °C
T _{max}	+ 350 °C	+ 250 °C
Casing	Spheroidal graphite cast iron	Stainless steel
Nominal pressure	PN 16	
H _{max} (2900 min ⁻¹)	100 m	60 m
Q _{max} (2900 min ⁻¹)	550 m ³ /h	170 m ³ /h
ATEX	II 3G, II 3D, II 2G, II 2D	

Description in full length → see brochure TOEM series

Regenerative turbine pumps with magnetic coupling



NPY-MK and CY-MK Series

Tried and tested and compact close-coupled pumps with top/top casings and magnetic coupling. Developed for transporting and circulating organic or synthetic heat transfer oils and hot water. Suitable for pumped media with low amounts of non-abrasive impurities. Suitable for the delivery of gas shares due to the principle of delivery.

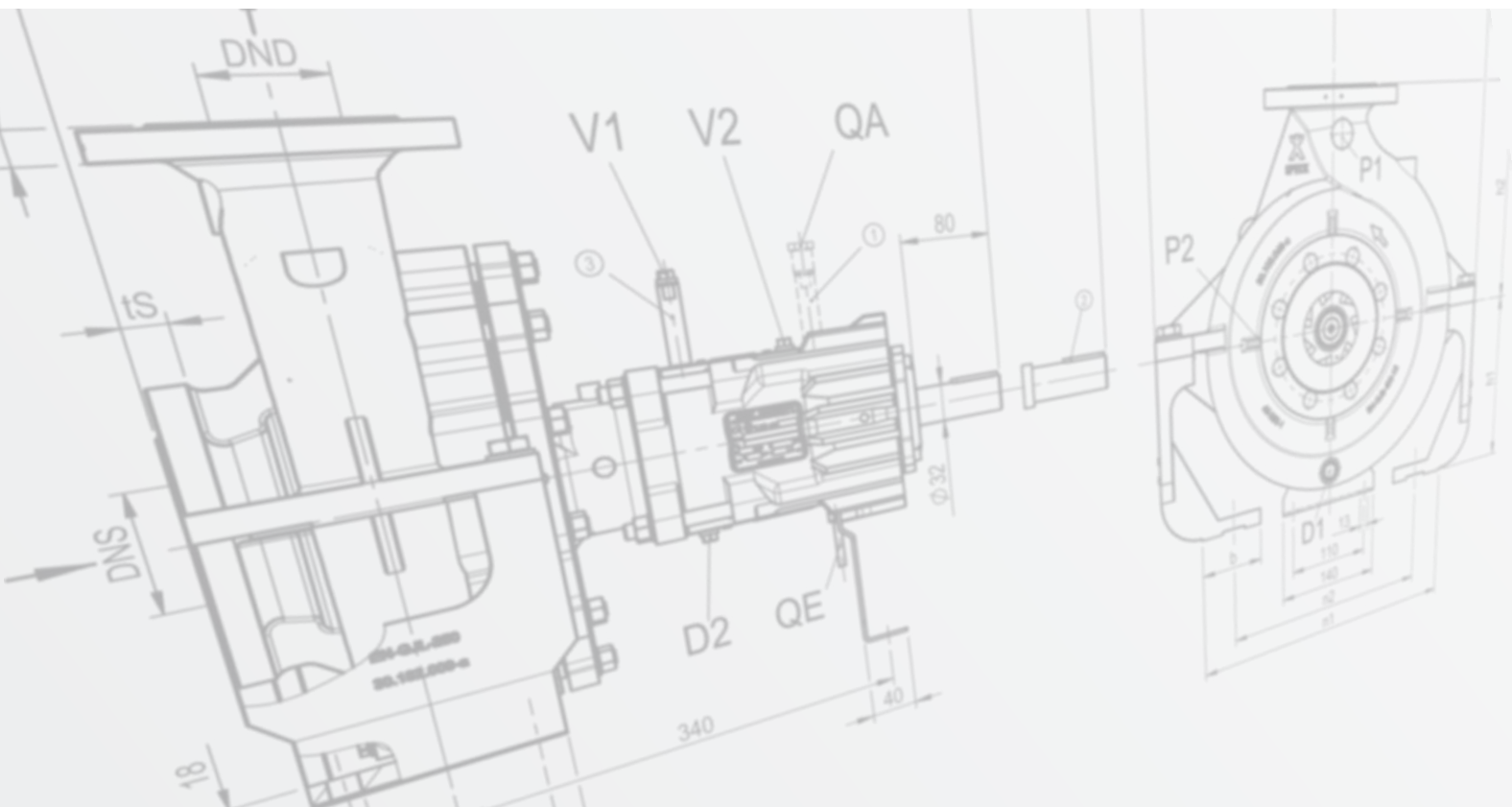
	Thermal oil versions	Hot water versions
Media	Heat transfer oil / thermal oil	Water
T _{min}	- 100 °C	-
T _{max}	+ 350 °C + 400 °C on request	+ 220 °C higher temp. on request
Casing	Spheroidal graphite cast iron or stainless steel	
Nominal pressure	PN 25 higher pressures on request	
H _{max} (2900 min ⁻¹)	90 m	
Q _{max} (2900 min ⁻¹)	12 m ³ /h (200 l/min) 24 m ³ /h (400 l/min) on request	
ATEX	II 3G, II 3D, II 2G, II 2D	

Compact, robust, durable and safe

Regenerative turbine pumps with magnetic coupling from Speck have been used in a wide range of systems and assemblies successfully for many years. The compact design requires minimal installation space and reduces the weight. The perfected pumps also impress with the small number of extremely high-quality parts.

Robust sleeve bearings made from SiC and ceramic shafts guarantee a long lifetime and are free from leakage and maintenance-free thanks to magnetic couplings.

On request, Speck can also develop special designs for special media or with different hydraulics. Please contact us.



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