

Volute pumps

for heat carrier oils up to 350 °C

SIHI *SuperNova*



ZTN 032-125 . . . 200-500

TECHNICAL DATA

Output:	max. 1000 m³/h
Delivery head:	max. 95 m
Speed:	max. 3600 rpm
Temperature:	max. 350 °C
Casing pressure:	PN 16
Shaft sealing:	radial seal rings or mechanical seal
Flange connection:	DIN EN 1092-2 PN 16 / 25 ¹⁾
Direction of rotation:	clockwise, when looking at the pump from the drive end



APPLICATION

Volute pumps of the series ZTN have been specially developed for handling of mineral and synthetic heat transfer oils. The pumps may be used in installations with positive or negative suction pressure.

Especially to be emphasised is the application in plants of:

The chemical industry:

heating of agitators, reactors, drying plants, polymerisation plants, plants for conveying high-viscous products and producing plastic materials and synthetic fibres.

The rubber and plastic industry:

heating of calendars, melting pots, power presses for plastics, automatic injection moulding machines, production of PVC adhesive tape.

The food industry:

heating of baking and fish-frying ovens, distillation of fatty acids and glycerine, fat softening plants, production of potato chips and milk powder.

The paper industry and laundries:

calendar rolls, production of corrugated cardboard, heating of washing machines, mangles and dryers.

DESIGN

Horizontal, single-stage volute pumps with the dimensions and nominal ratings to 24255/EN 733 in back pull out design* which permits the removal of the complete bearing unit toward the drive end without removing the pump casing from the pipe work. If a spacer coupling is installed it is also unnecessary to disconnect the motor.

The programme comprises 38 pump sizes, but only three shaft assemblies are required owing to the unit construction system. Within each shaft assembly, shafts, shaft sealing, impeller fastenings, bearing bracket and bearing covers are interchangeable.

The DIN 4754 regulations are complied with.

Should heat carrier seepage occur from the shaft seal, it is ensured that the leakage will be drained off and collected completely.

1) from size 150315 to 200500

* due to additional sizes the performance range is increased to higher output rates.

CONSTRUCTION

Casing pressure:

Maximal 16 bar from 0 °C to 120 °C

Maximal 13 bar from 120 °C to 300 °C

Maximal 10 bar from 300 °C to 350 °C

Intermediate values can be obtained by interpolation.

Please note:

Technical rules and safety regulations.

Max. Casing pressure = inlet pressure + zero head

Admissible inlet pressure (system pressure) = 5 bar when using shaft sealing 002.

Admissible inlet pressure = admissible casing pressure when using shaft sealing GBC.

Flanges location:

Axial suction flange, discharge flange radially upwards.

Flanges:

The flanges comply with DIN EN1092-2/PN 16, resp. PN 25. Flanges drilled to according to ANSI (previous ASA) 150 can be supplied.

Hydraulic:

Designation of this construction type: A, B, D

Bearing:

One grease-lubricated grooved ball bearing resp. 2 inclined ball bearings (the first grease filling is made in the factory) and one internal liquid flushed sleeve bearing.

Designation of this construction type: ·A

Direction of rotation:

Clockwise, when looking at the pump from the drive end.

Shaft sealing:

Code 002: several radial shaft seal rings arranged in series; uncooled

Code GBC: unbalanced bellows mechanical seal
seal face materials cast chromium steel/carbon
elastomer FPM (Viton)

Material design:

ITEM	COMPONENTS	MATERIAL						EXECUTION	
		EN mat.-number	EN mat.- denomination	DIN mat.-number	DIN mat.- denomination	US denomination		1B	2B ¹⁾
						ASTM Standard	AISI		
10.20	Volute casing	EN-JS 1025	EN-GJS-400-18-LT	0.7043	GGG-40.3	A 395		X	
		1.0619	GP 240 GH	1.0619	GS-C 25	A 216 Gr WCB			X
16.10	Casing cover	EN-JS 1025	EN-GJS-400-18-LT	0.7043	GGG-40.3	A 395		X	
		1.0619	GP 240 GH	1.0619	GS-C 25	A 216 Gr WCB			X
21.00	Shaft	1. 1191	C 45 E	1.1191	Ck 45 K + N	A 576 Gr 1045	1045	X	
		1.4021	X 20 Cr 13	1.4021	X 20 Cr 13	A 276 Type 420	420	X ²⁾	X
23.00	Impeller	EN-JL 1040	EN-GJL 250	0.6025	GG-25	A 278 Class 30		X	X
33.00	Bearing bracket								
36.00	Bearing cover								
42.13	Radial seal rings	FPM (Viton)						X	X
43.30	Mechanical seal	chrome cast / carbon FPM (Viton)						X	X
44.10	Casing for mech. seal of the shaft casing	1. 1191	C 45 E	1.1191	Ck 45 K + N	A 576 Gr 1045	1045	X	X
44.11									
54.51	Sleeve bearing	carbon						X	X

1) For sizes 200400 and 200500.

2) For sizes 150315, 150400, 150500, 200250 and 200315.

Casing gasket:

The casing is sealed by flat gaskets of graphite. Designation of this construction type: 2

Motor power:

Using commercial electric motors, type of construction IM B3.

To determine the drive power we recommend the following safety margin:

up to 4 kW: 25%

4 to 7,5 kW: 20%

above 7,5 kW: 15%

The following maximum speeds are to be observed:

max. speed n = 3600 rpm	size	max. speed n = 3000 rpm	size	max. speed n = 1800 rpm	size	max. speed n = 1500 rpm	size
t = 120 °C	032125 050200	t = 120 °C	032250	t = 120 °C	040315 150315	t = 120 °C	150500
	032160 065125		040250		050315 150400		200315
	032200 065160		050250		065315 200250		200400
	040125 065200		065250		080315		
	040160 080160		080250		100315		
	040200 080200		100250		125250		
	050125 100160		125200		150200		
	050160 100200				150250		
t = 350 °C	032125 050200	t = 350 °C	040250	t = 350 °C	040315 150250	t = 350 °C	150315
	032160 065125		050250		050315		150400
	032200 065160		065200		065315		150500
	040125 080200		065250		080315		200250
	040160 100160		080160		100315		200315
	040200		080250		125200		200400
	050125		100200		125250		200500
	050160		100250		150200		

The maximum speeds result from the permissible peripheral speeds of the impellers or from the shaft load admissible at higher temperatures, respectively.

Bearing bracket / pump size:

Bracket 25	032125 032160 032200 032250 040125 040160 040200 040250 050125 050160 050200 050250 065125 065160 065200 080160
Bracket 35	040315 050315 065250 065315 080200 080250 080315 100160 100200 100250 100315 125200 125250 150200 150250
Bracket 45	150315 150400 150500 200250 200315 200400 200500

General remarks:

For horizontal volute pumps CLOSE COUPLED construction with STANDARD motor for nominal performances and flange connections as per EN 733 refer to our series **ZTK**.

For INLINE pumps with the same drive unit, consisting of bearing bracket with bearing, stub shaft and mechanical seal, casing cover, impeller and impeller nut, refer to our series **ZTI**.

For equipping hot media systems a complete programme is available for a flow range between 1-600 m³/h consisting of the range:

ZEN volute pumps to EN 22858, t_{max} 230 °C PN 40. Hot water design.

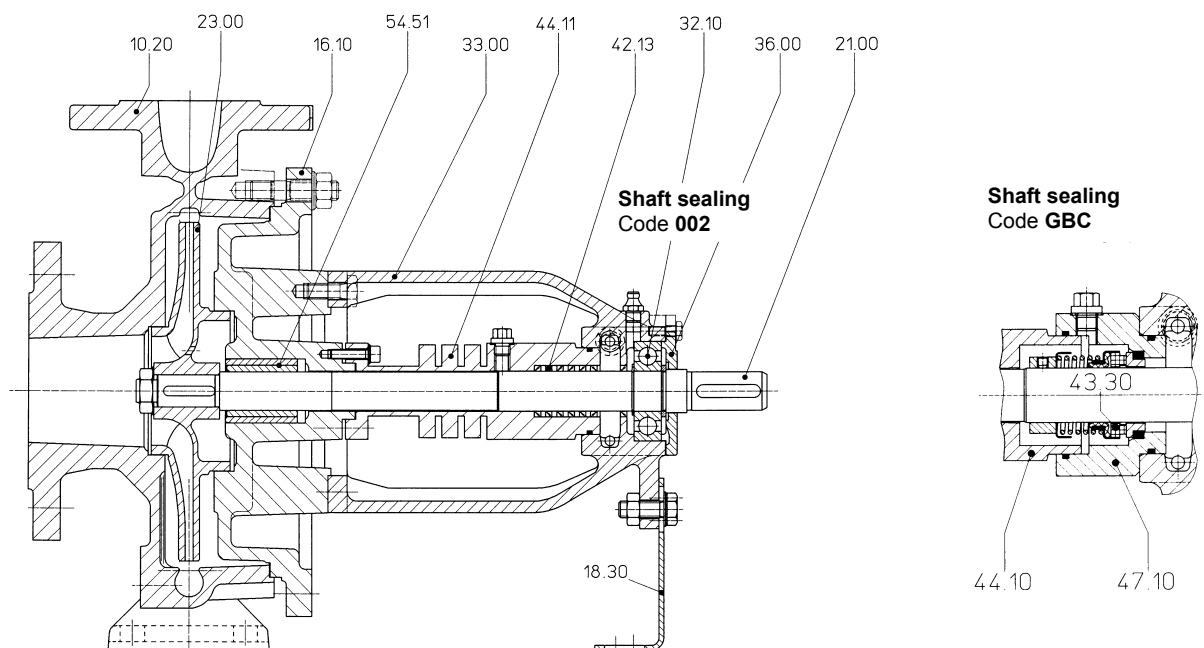
ZDN volute pumps to EN 22858, t_{max} 207 °C PN 25. Hot water design.

ZHN volute pumps to EN 733, t_{max} 180 °C PN 16. Hot water design.

ZLI volute pumps to EN 733 as INLINE construction, t_{max} 150 °C PN 25. Hot water design.

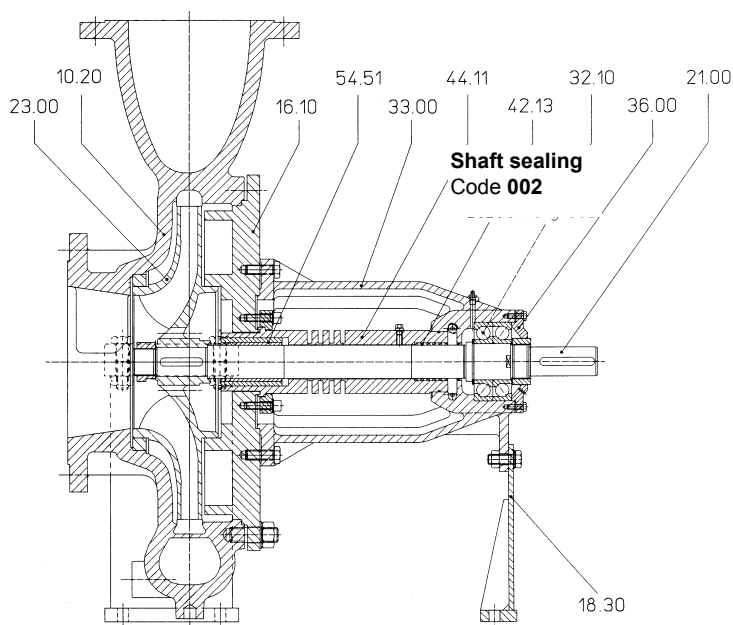
Technical documentation on these programmes will readily be supplied on request.

SECTIONAL DRAWING AND NOMENCLATURE
ZTN 032125 ... 150250

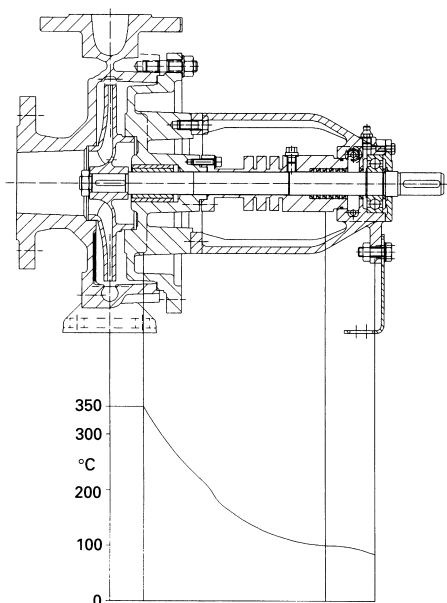


- 10.20 volute casing
- 16.10 casing cover
- 18.30 supporting foot
- 21.00 shaft
- 23.00 impeller
- 32.10 grooved ball bearing
- 33.00 bearing bracket
- 36.00 bearing cover
- 42.13 radial seal ring
- 43.30 mechanical seal
- 44.10 shaft seal casing
- 44.11 shaft seal casing
- 47.10 sealing cover
- 54.51 sleeve bearing

ZTN 150315 ... 200500



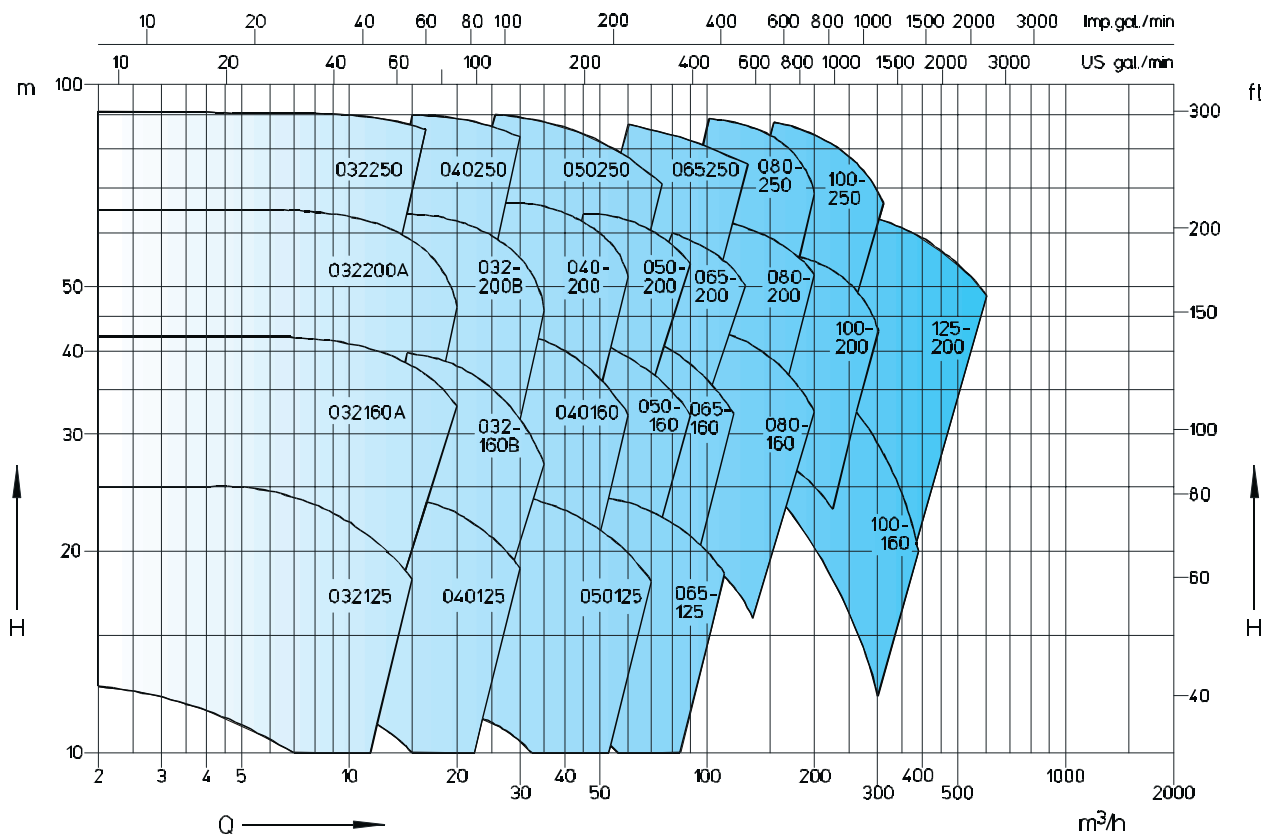
Heat barrier / shaft sealing / bearing



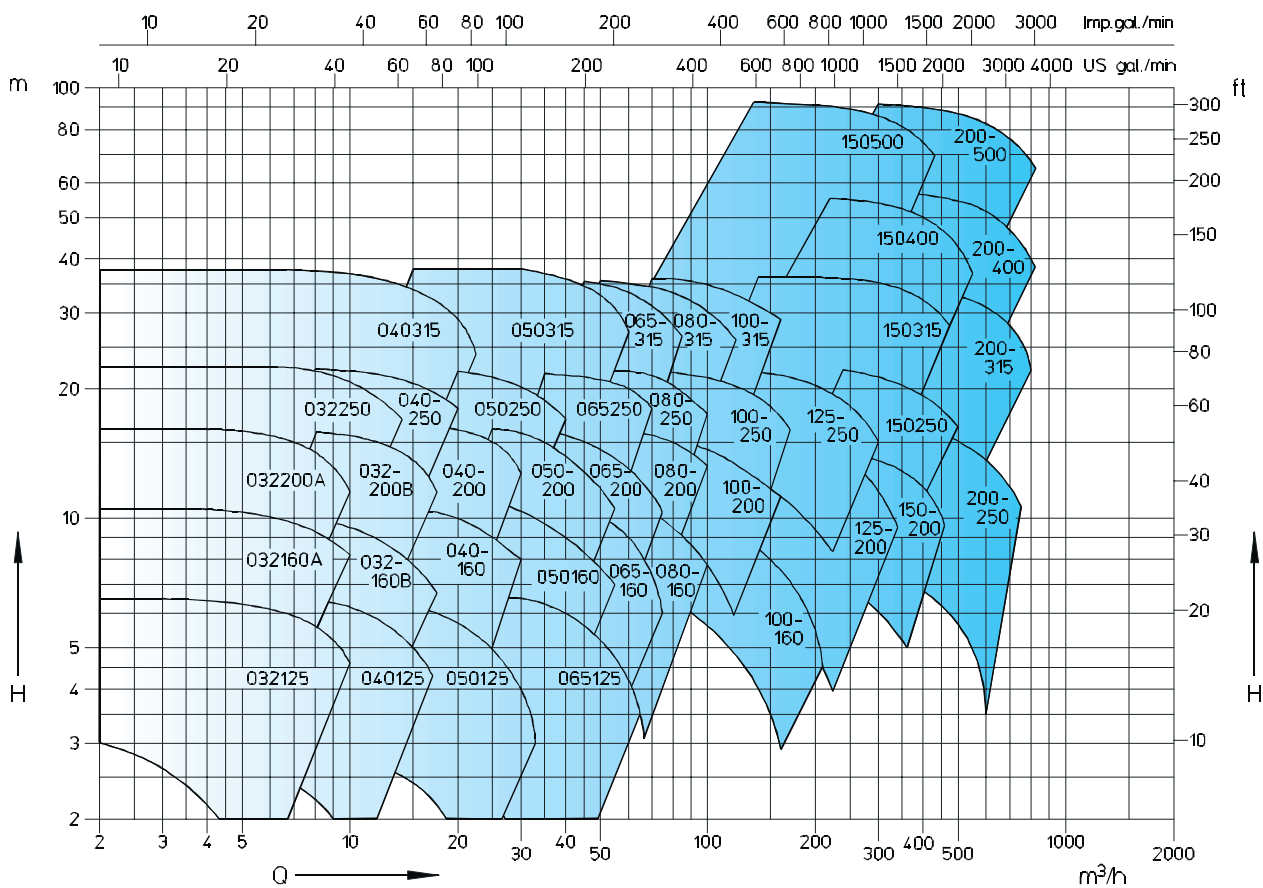
Heat transfer installations have achieved a high level of technical development. Consequently the requirements on pumps handling heat transfer oils have increased regarding operating safety, environmental protection, maintenance and operating costs. The Sterling SIHI ZTN pump, based on many years of experience and on the latest technical know-how, fully complies with these requirements.

By the heat barrier with integrated throttle gab, located behind the cover, a favourable drop in temperature toward the drive side is achieved (see opposite drawing). Heat losses at the product side are effectively prevented (saving of energy). The reduced temperature allows the use of simple, uncooled type of shaft sealing. As the lubricating properties of heat transfer oils for antifriction bearings are not specially good, a liquid flushed sleeve bearing has been fitted at the impeller side and an antifriction bearing, not in contact with the heat carrier, has been fitted behind the shaft sealing. By this arrangement noiseless operation and long working life have been achieved.

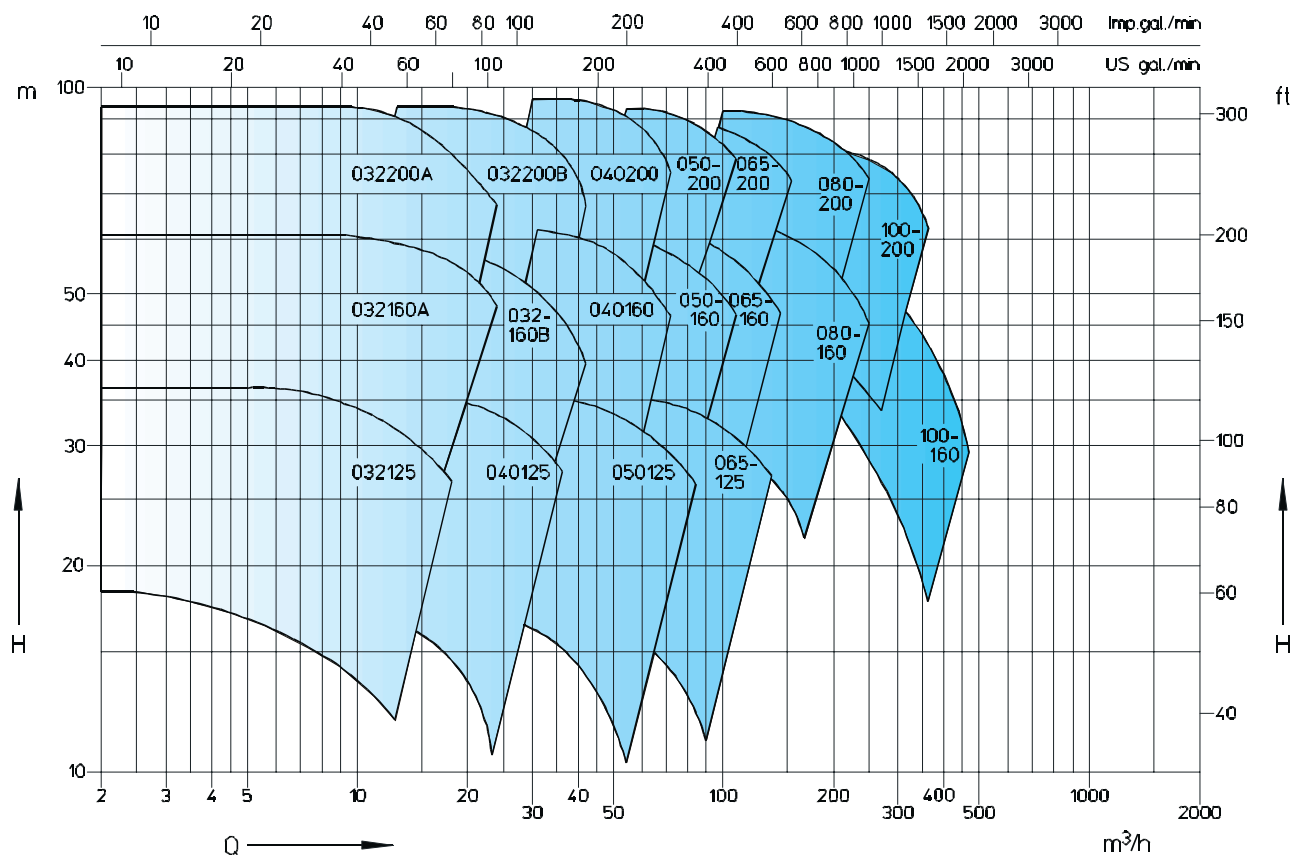
n=2900 1/min



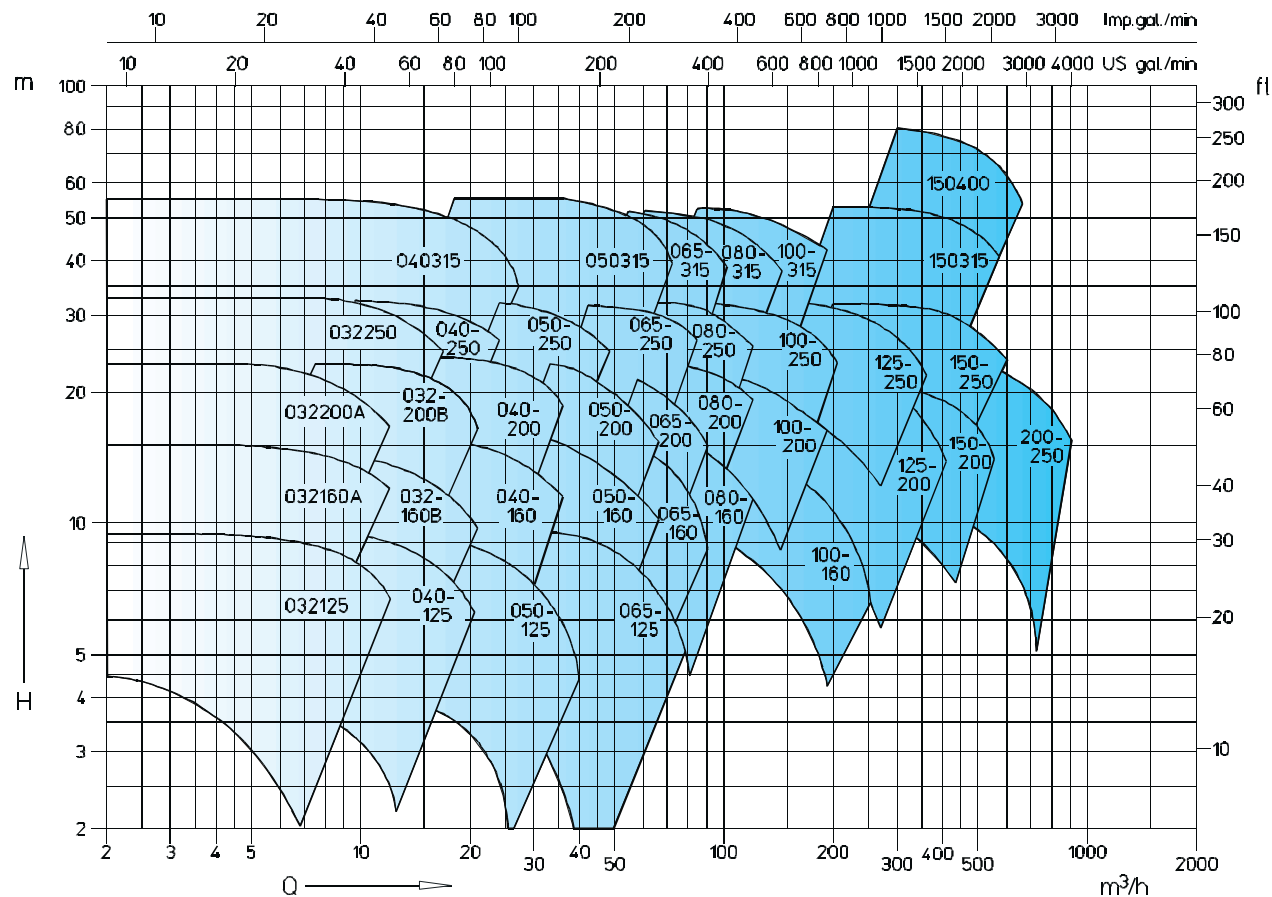
n=1450 1/min



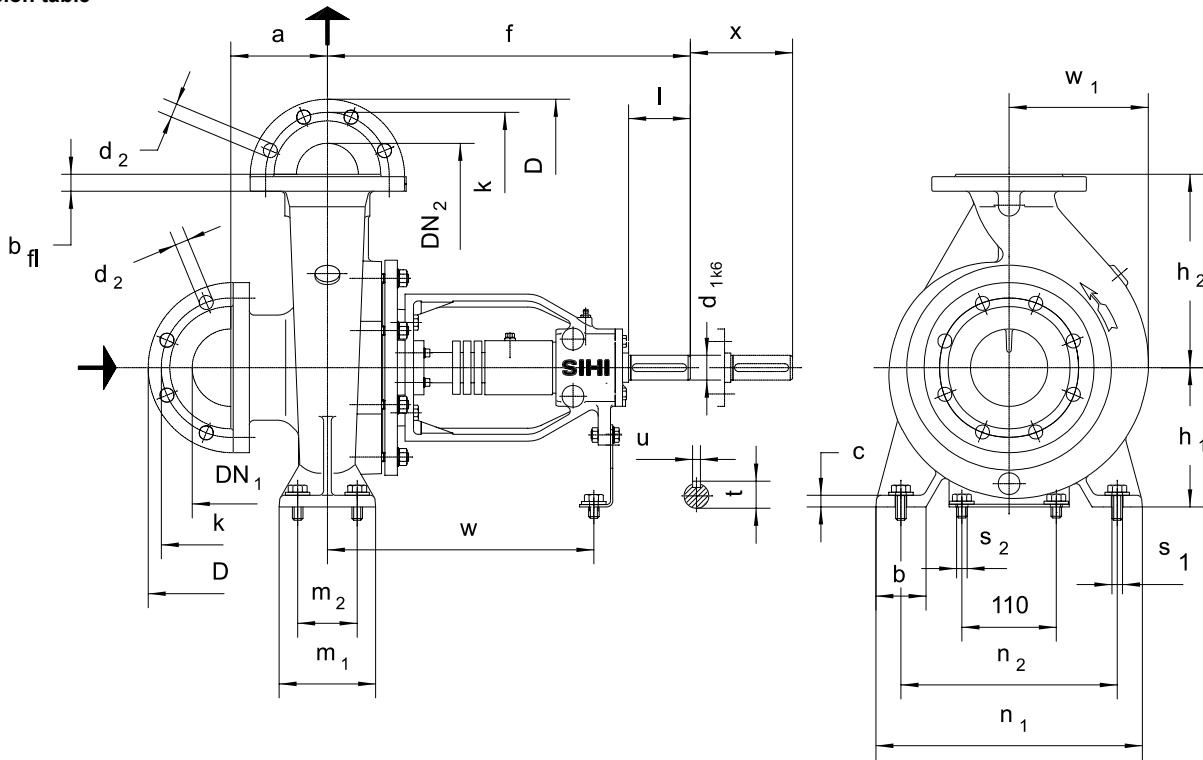
$n=3500$ 1/min



$n=1750$ 1/min



Dimension table



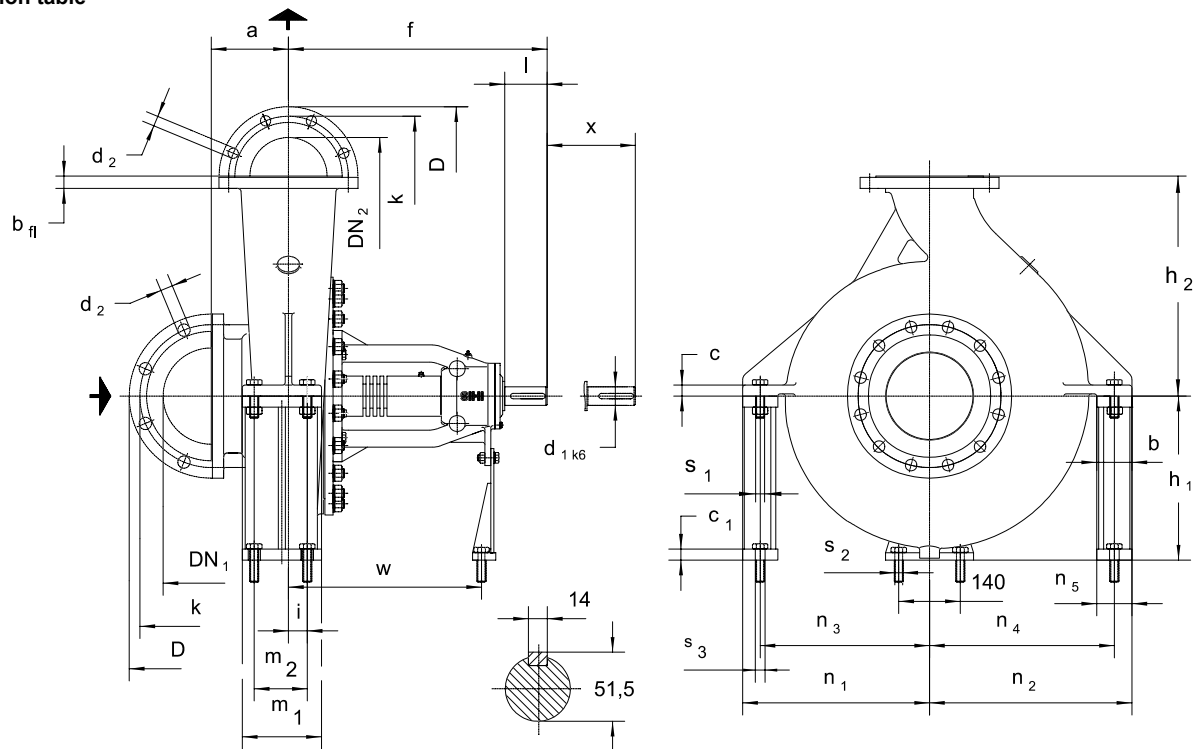
All dimensions in mm.

size	DN ₂	DN ₁	a	b	c	f	h ₁	h ₂	m ₁	m ₂	n ₁	n ₂	S ₁ *	S ₂ *	w	w ₁	x	d ₁	l	t	u
032125	32	50	80	50	15	360	112	140	100	70	190	140	M12	M12	267	105	100	24	50	27	8
032160							132	160			240	190									
032200							160	180			265	212									
032250 ¹⁾							180	225			320	250									
040125	40	65	80	50	18	470	112	140	125	95	210	160	M12	M12	340	108	100	32	80	35	10
040160							132	160			240	190									
040200							160	180			265	212									
040250							180	225			320	250									
040315 ¹⁾	50	100	100	65	17	470	125	250	160	120	345	280	M16	M16	340	164	100	32	80	35	10
050125							132	160			240	190									
050160							160	180			265	212									
050200							180	225			320	250									
050250	65	80	100	65	18	470	132	160	125	95	240	190	M12	M12	267	120	100	24	50	27	8
050315 ¹⁾							160	180			265	212									
065125							180	225			320	250									
065160							200	250			360	280									
065200	80	100	125	80	18	470	160	225	160	120	345	280	M16	M16	340	166	100	32	80	35	10
065250							180	225			280	212									
065315							200	250			360	280									
080160							225	280			400	315									
080200	100	125	140	80	18	470	180	225	125	95	320	250	M12	M12	267	165	100	24	50	27	8
080250							200	280			345	280									
080315							250	315			400	315									
100160 ¹⁾							280	355			450	400									
100200	125	150	160	100	20	470	200	280	160	120	360	280	M16	M16	340	202	100	32	80	35	10
100250							225	280			400	315									
100315							250	315			450	400									
125200 ¹⁾							280	355			500	450									
125250	150	200	160	100	20	470	200	280	160	120	360	280	M16	M16	340	212	100	32	80	35	10
150200 ¹⁾							225	280			400	315									
150250 ¹⁾							250	315			450	400									
150315							280	355			500	450									

¹⁾Transnorm pump sizes, not included in DIN 24255/ EN 733. Flanges drilled according to ANSI 150 can be supplied.

*Slots suitable for bolts with dimensions indicated. Bolts are not included in the bare shaft pump standard scope of supply.

Dimension table



All dimensions in mm.

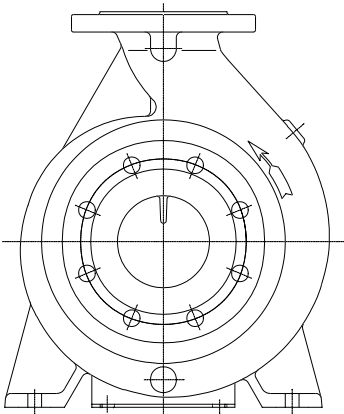
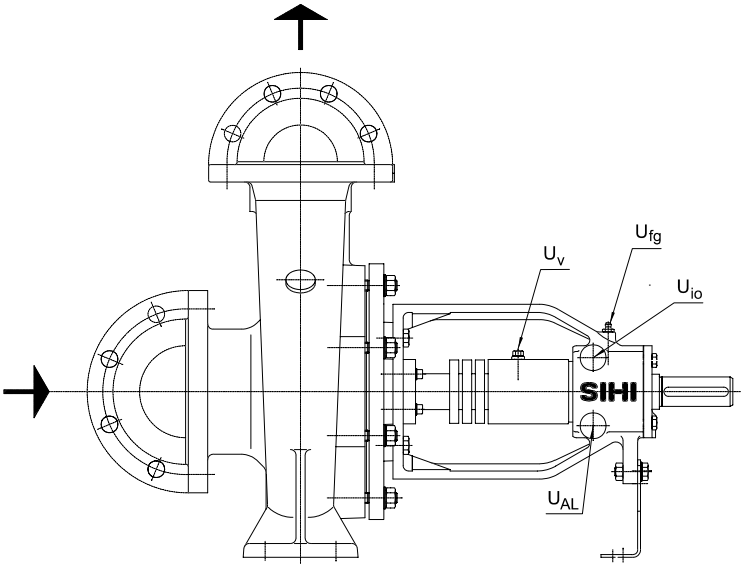
size	DN ₂	DN ₁	a	f	h ₁	h ₂	m ₁	m ₂	i	l	x	d ₁	w	c	c ₁	s ₁	s ₂ *	s ₃ *	n ₁	n ₂	n ₃	n ₄	b,n ₅									
150315 ¹⁾	150	200	180	670	315	400	160	100	35	110	180	48	500	25	23	M20	M12	M20	320	360	290	330	60									
150400 ¹⁾					355	450	180	120											45	380	420	340	380	80								
150500 ¹⁾					400	500			35								425			460	385	420										
200250 ¹⁾	200	250	200		335	425	180	120									45		110	180	48	500	25		23	M20	M16	340	410	300	370	80
200315 ¹⁾					355	450			35																			360	420	320	380	
200400 ¹⁾					375	500																						400	480	360	440	
200500 ¹⁾					425	560																						220	160	50	30	

¹⁾Transnorm pump sizes, not included in DIN 24255/ EN 733. Flanges drilled according to ANSI 150 can be supplied.

*Slots suitable for bolts with dimensions indicated. Bolts are not included in the bare shaft pump standard scope of supply.

Flange connection according to DIN EN 1092-2 PN 16 Execution material 1B										DIN EN 1092-2 PN 25				
										Execution material 1B			Execution material 2B	
DN ₂ /DN ₁	32	40	50	65	80	100	125	150	200	150	200	250	200	250
D	140	150	165	185	200	220	250	285	340	300	360	425	360	425
k	100	110	125	145	160	180	210	240	295	250	310	370	310	370
b _{fl}	18	19	19	19	19	19	19	19	20	20	22	24,5	30	32
Tolerances	+4,0 -3,0									+4,5 -4,0			+1,5 -1,5	
d ₂ x number	19x4	19x4	19x4	19x4	19x8	19x8	19x8	23x8	23x12	28x8	28x12	31x12	26x12	30x12

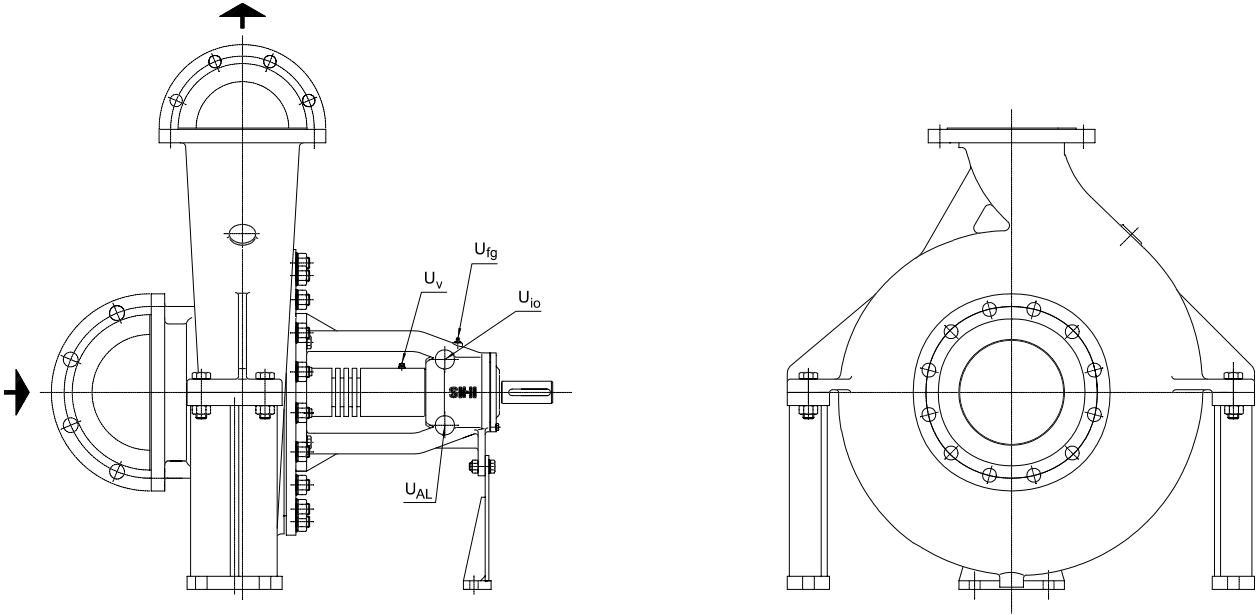
Connections for bearing brackets 25 and 35



U_{fg} : Grease filling connection.
 U_{io} : Sealing liquid connection.
 U_{AL} : Drainage for leakage.
 U_v : Vent connection

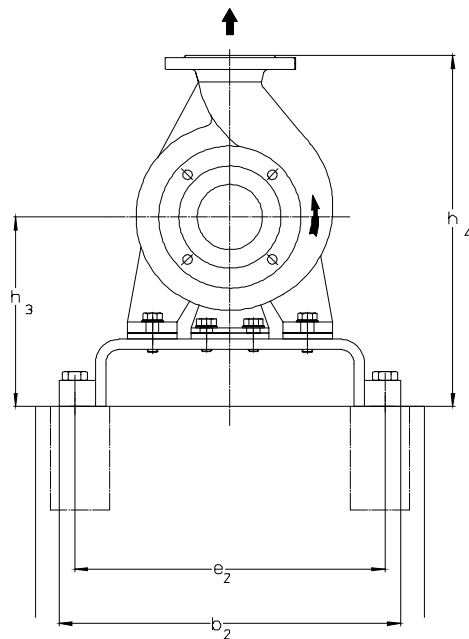
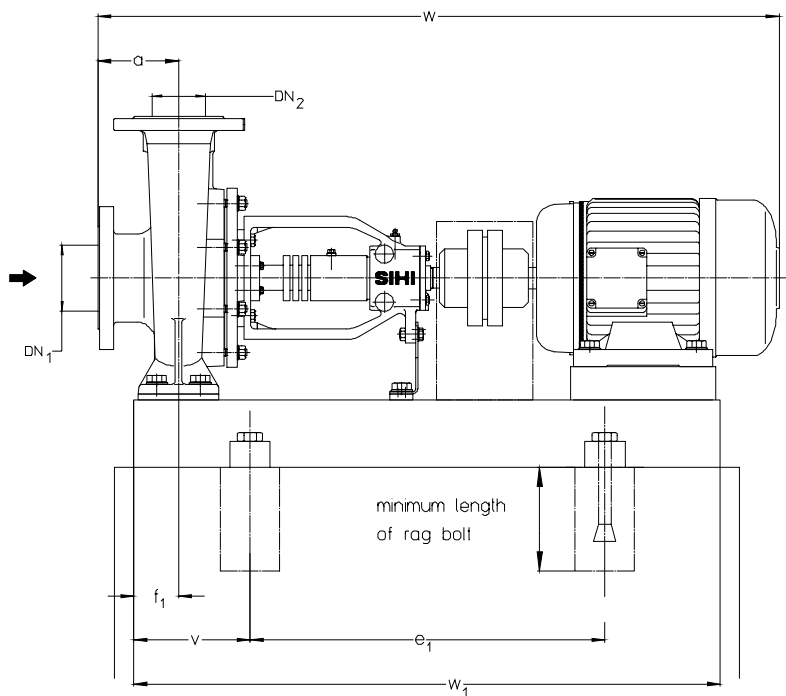
Size	U_{fg}	U_v	U_{io}	U_{AL}
032125	G 1/8	G 1/8	G 1/4	G 1/4
032160				
032200				
032250				
040125				
040160				
040200				
040250				
040315				
050125				
050160				
050200				
050250				
050315				
065125				
065160				
065200				
065250				
065315				
080160				
080200				
080250				
080315				
100160				
100200				
100250				
100315				
125200				
125250				
150200				
150250				

Connections for bearing bracket 45



u_{fg} : Grease filling connection.
 u_{io} : Sealing liquid connection.
 u_{AL} : Drainage for leakage.
 u_v : Vent connection.

Size	u_{fg}	u_v	u_{io}	u_{AL}
150315	G 1/8	G 1/8	G 1/4	G 1/4
150400				
150500				
200250				
200315				
200400				
200500				



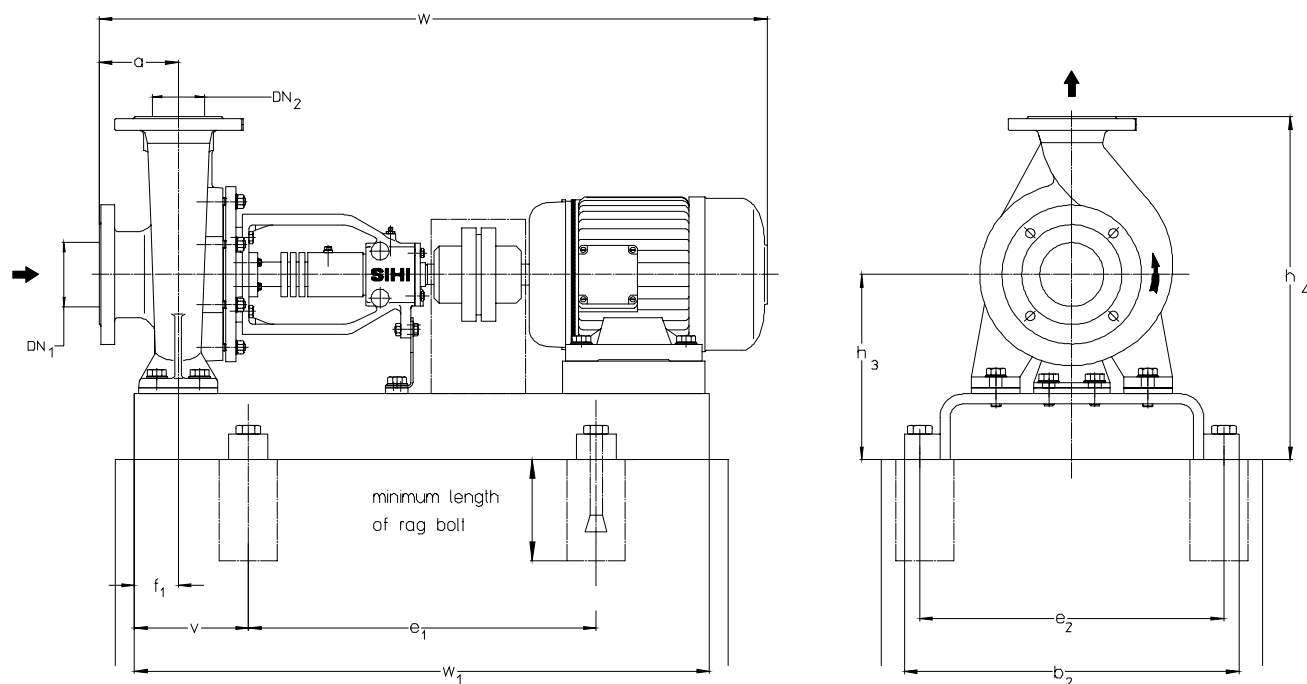
Dimensions in mm.

Dimensional tolerances admissible (base plates) for welded parts according to DIN 8570 B

size	motor		base plate No.	coup- ling **	weight		DN ₂	DN ₁	a	b ₂	e ₁	e ₂	v	f ₁	h ₃	h ₄	w*	w ₁	rag bolt DIN 529				
032125	71	0.25	S008	B68	32	51	32	50	80	297	400	265	120	60	152	292	682	640	M12x100				
	71	0.37				52																	
032160	71	0.37	S270		41	69				360	420	320	115		197	357	716	650		M16x200			
	80	0.55				72																	
032200	80	0.55	S301		39	70			390	480	350	125	225	405	774	730							
	80	0.75				78																	
	90S	1.10	80																				
	90L	1.50	103																				
032250	80	0.75	S383	52	106	100	490	600	440	160	75	260	485	736	920	M20x400							
	90S	1.10			108																		
	90L	1.50		108																			
	100L	2.20		B80	118																		
040125	71	0.25	S270	B68	34	61	40	65	80	360	420	320	115	60	177	317	682	650	M16x200				
	71	0.37				62											716						
	80	0.55			65	682																	
040160	71	0.37			39	69				390	480	350	125		197	357	716			730	M20x400		
	80	0.55				70											774						
	80	0.75			78																		
040200	90S	1.10	S301		43	79			100	490	600	440	160	75	260	485	736	920	M20x400				
	80	0.75				82																	
	90S	1.10	84																				
	90L	1.50	111																				
040250	90S	1.10	S383	B80	57	113	125	540	660	490	170	75	305	555	794	1000	M20x400						
	100L	2.20				123									835								
	100L	3.00		153	970																		
	100L	2.20		154	991																		
040315	100L	3.00	S434	B95	87	154	125	540	660	490	170	75	305	555	1067	1000	M20x400						
	132S	5.50				199									1067								
050125	71	0.37	S270	B68	35	63	50	65	100	360	420	320	115	60	197	357	702	650	M16x200				
	80	0.55				67											736						
	80	0.75	44		80	390				480	350	125	225		405	736	730						
80	0.55	83			794																		
050160	90S	1.10	S301		43	79				100	490	600	440		160	75	260			485	736	920	M20x400
	80	0.75				82																	
	90S	1.10	84																				
	90L	1.50	94																				
050200	100L	2.20	B80	57	113	125	540	600	440	160	75	260	485	794	920	M20x400							
	90L	1.50			123									835									
	100L	3.00	124	856																			
	112M	4.00	157	991																			
050250	112M	4.00	S383	B80	90	202	125	540	660	490	170	75	305	585	1067	1000	M20x400						
	100L	2.20				205									1093								
	100L	3.00		205	1093																		

Foundation plan
n = 1450 rpm

size	motor		base plate No.	coup- ling **	weight		DN ₂	DN ₁	a	b ₂	e ₁	e ₂	v	f ₁	h ₃	h ₄	w*	w ₁	rag bolt DIN 529					
	size	kW			pump kg	Unit kg																		
065125	80	0.55	S342	B68	39	83	65	80	100	450	540	400	140	60	240	420	736	820	M20x400					
	80	0.75				86											794							
	90S	1.10				89											736							
065160	80	0.75			45	92										440	794							
	90S	1.10				94											736							
	90L	1.50				105											794							
	100L	2.20	835																					
065200	90S	1.10	S383	B68	48	102			490	600	440	160	75	260	485	794	920							
	90L	1.50		104		835																		
	100L	2.20		115		856																		
	100L	3.00	B80	78	161	90										300	550			945	1000			
	112M	4.00			162															966				
065250	100L	2.20	S434	B80	78				190	540	660	490	170	90	280			530		1042				
	112M	4.00							231											1067				
	132M	5.50				234			1093															
	160M	11.00				250	1185																	
065315	160L	15.00	S486	B110	94	280	610	840	550	205	90	325	605	1247	1250	M24x400								
	80	0.75				102								490			600	440	160	75	260	485	920	M20x400
	90S	1.10				105																		
	90L	1.50				107																		
080160	100L	2.20	S383	B68	51	118	80	100	125	610	840	550	205		90	300								
	100L	3.00				127								991										
	112M	4.00				137								1067										
	132S	5.50				138								1093										
	132S	5.50				183								1185										
080200	100L	2.20	S434	B80	71	192			540	660	490	170	90	350	665	1247	1000							
	100L	3.00				193										970								
	112M	4.00				199										1067								
	132S	5.50				221										1093								
	132M	7.50				224										1185								
080250	132S	5.50	S486	B80	84	241			610	840	550	205	90	350	665	1247	1250	M24x400						
	132M	7.50				244										1093								
	160M	11.00				260										1185								
	160L	15.00				290										1247								
	080315	100L				2.20										S434			B95	104	163	100	125	140
100L		3.00	164	992																				
112M		4.00	192	1068																				
132S		5.50	162	971																				
132S		5.50	163	992																				
100160	100L	2.20	S486	B80	80	191	610	840	550	205	90	325	605	1068	1250	M24x400								
	100L	3.00				194								1108										
	112M	4.00				198								1200										
	132S	5.50				226								1262										
	132M	7.50				229								1282										
100200	160M	11.00	S434	B95	79	245	610	840	550	205	90	350	665	1108	1120									
	160L	15.00				262								1220										
	132M	7.50				292								1282										
	112M	4.00				304								1344										
	132S	5.50				320								1346										
100250	180L	22.00	S486	B125	106	377	610	840	550	205	90	350	665	1404	1250									
	132M	7.50				395								1404										
	160M	11.00				337								1482										
	160M	11.00				339								1540										
	132M	7.50				377								1540										
100315	160L	15.00	S605	B95	120	421	730	840	670	205	110	380	780	1402	1120									
	160L	15.00				467								1469										
	180M	18.50				487								1469										
	180L	22.00				487								1469										
	200L	30.00				487								1469										
125200	225S	37.00	S606	B140	134	487	730	840	670	205	110	380	780	1469	1250									
	225M	45.00				487								1469										
	132M	7.50				242								1108										
	160M	11.00				258								1200										
	160L	15.00				288								1262										
125250	132M	7.50	S486	B95	102	249	610	840	550	205	90	350	665	1108	1250	M24x400								
	160M	11.00				265								1200										
	160L	15.00				295								1262										
	132M	7.50				249								1108										
	160M	11.00				265								1200										
150200	160L	15.00	S605	B95	120	278	125	150	160	730	840	670	205	110	380	780	1128	1120						
	160M	11.00				294											1220							
	180M	18.50				323											1282							
	180L	22.00				335											1344							
	200L	30.00				351											1346							
150250	200L	30.00	S606	B125	134	395	730	840	670	205	110	380	780	1404	1250									
	160L	15.00				337								1482										
	180M	18.50				339								1540										
	180L	22.00				377								1540										
	200L	30.00				421								1402										
150315	225S	37.00	S606	B140	134	467	730	840	670	205	110	380	780	1469	1250									
	225M	45.00				487								1469										
	132M	7.50				242								1108										
	160M	11.00				258								1200										
	160L	15.00				288								1262										
150400	132M	7.50	S486	B95	102	249	610	840	550	205	90	350	665	1108	1250	M24x400								
	160M	11.00				265								1200										
	160L	15.00				295								1262										
	132M	7.50				249								1108										
	160M	11.00				265								1200										
150500	160L	15.00	S486	B110	109	295	610	840	550	205	90	350	665	1262	1250									
	132M	7.50				249								1108										
	160M	11.00				265								1200										
	160L	15.00				295								1262										
	132M	7.50				249								1108										
200250	160M	11.00	S486	B95	102	258	610	840	550	205	90	350	665	1200	1250									
	160L	15.00				288								1262										
	132M	7.50				249								1108										
	160M	11.00				265								1200										
	160L	15.00				295								1262										
200315	132M	7.50	S486	B95	102	242	610	840	550	205	90	350	665	1108	1250									
	160M	11.00				258								1200										
	160L	15.00				288								1262										
	132M	7.50				249								1108										
	160M	11.00				265								1200										
200400	160L	15.00	S486	B110	109	295	610	840	550	205	90	350	665	1262	1250									
	132M	7.50				249								1108										
	160M	11.00				265								1200										
	160L	15.00				295								1262										
	132M	7.50				249								1108										
200500	160M	11.00	S486	B95	102	258	610	840	550	205	90	350	665	1200	1250									
	160L	15.00				288								1262										
	132M	7.50				249								1108										
	160M	11.00				265								1200										
	160L	15.00				295								1262										
Foundation plans with base plates and fittings on request																								



Dimensions in mm.

Dimensional tolerances admissible (base plates) for welded parts according to DIN 8570 B

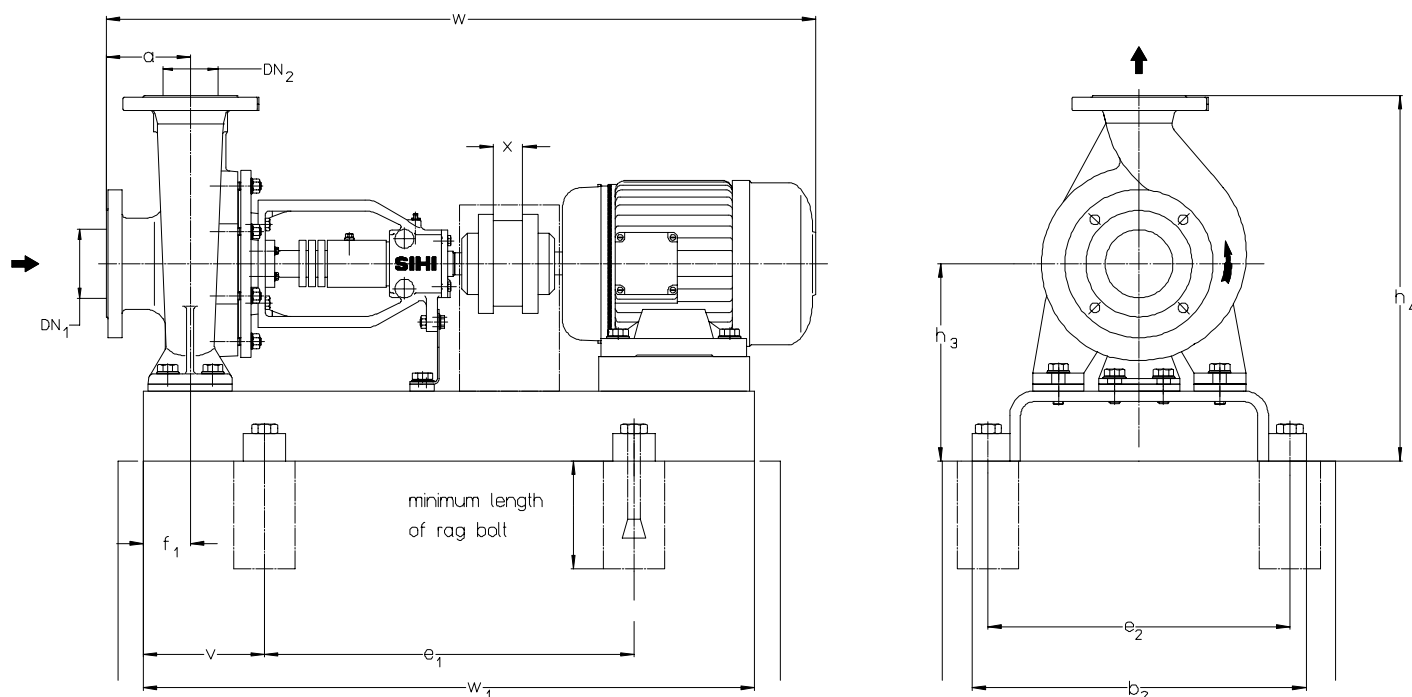
size	motor size	kW	base plate No.	coup- ling **	pump kg	weight Unit kg	DN ₂	DN ₁	a	b ₂	e ₁	e ₂	v	f ₁	h ₃	h ₄	w*	w ₁	rag bolt DIN 529										
032125	71	0.55	S008	B68	32	52	32	50	80	297	400	265	120	60	152	292	682	640	M12x100										
	80	0.75				55											716												
	80	1.10				67											774												
	90S	1.50	S241			69											716												
	90L	2.20				72											774												
032160	80	1.10	S270		41	72				32	50	80	360		420	320	115	60	197	357	716	730	M16x200						
	90S	1.50	80			774																							
	90L	2.20	82			836																							
	100L	3.00	92			895																							
	112M	4.00	93	912																									
	132S	5.50	S342	B95		130							895																
	132S	7.50				148							932																
	160M	15.00				167							1050																
032200	90L	2.20	S301	B68	39	80							40	65	100	490	600		440	160	75	260	485	774	730	M16x200			
	100L	3.00				90																		836					
	112M	4.00				91																		895					
	132S	5.50	S342	B95		128																		912					
	132S	7.50				147																		1088					
	160M	11.00				175										1150													
	160M	15.00				148										932													
	160L	18.50	S344			167										1050													
	132S	7.50				148										932													
	160M	11.00				167										1050													
032250	160M	15.00	S383		52	167			100							490	600	440	160	75		260	485	1050	920	M20x400			
	160M	15.00				167																		1050					
	160M	15.00				167																		1050					
040125	80	1.10	S270	B68	34	65	40	65	80							360	420	320	115	60	177	317	716	650	M16x200				
	90S	1.50	70			774																							
	90L	2.20	71			815																							
	100L	3.00	S241			82				815																			
	90S	1.50				78				776																			
040160	90L	2.20	S301	B80	39	80				40	65	80				390	480	350	125		60	197	357	776		730	M16x200		
	100L	3.00				80																		836					
	112M	4.00				91																		895					
	132S	5.50				128																		912					
	132S	7.50	S342			138																		450				540	400
	160M	11.00				159							1030																
	160M	15.00				158							912																
	160L	18.50				175							1050																
040200	100L	3.00	S301	B80	43	94							40	65	80	390	480	350	125	60		225	405	817	730	M16x200			
	112M	4.00				95																		856					
	132S	5.50				132																		932					
	132S	7.50	S342			158																		1050					
	160M	11.00				153																		932					
	160M	15.00	S383			B95				57	172	932																	
	160M	11.00									172	1050																	
160M	15.00	172		1050																									
040250	160L	18.50	S434	57	216						100	490				600	440	160	75		260	485	1112	1000	M20x400				
	160M	15.00			172																		1050						
	160L	18.50			216				1112																				

Foundation plan

n = 2900 rpm

size	motor		base plate No.	coup- ling **	weight		DN ₂	DN ₁	a	b ₂	e ₁	e ₂	v	f ₁	h ₃	h ₂	w*	w ₁	rag bolt DIN 5298																
	Size	kW			pump kg	unit kg																													
050125	90S	1.50	S301	B68	35	74	50	65	100	390	480	350	125	60	197	357	794	730	M16x200																
	90L	2.20				76											835	820																	
	100L	3.00	S272	B80		86											856																		
	112M	4.00				87											360			540	320	140	212	372	932										
	132S	5.50	S342	B95		124												400	794						730	M20x400									
050160	90L	2.20	S301	B68	44	85				50	65	100	390		480	350	125	60	225	405	835	730	M16x200												
	100L	3.00				B80															95	835		820											
	112M	4.00	S342	B95																	96	856													
	132S	5.50				133															450	540			400	140	240	420	932	820	M20x400				
	132S	7.50	159	490		600															440	160	1050	920											
	160M	11.00	S383	172		490	600	440					160	240	420	932	820		M20x400																
	050200	100L	3.00	S301		B80	43	94					50	65	100	390	480			350	125	60	225	425	817	730	M16x200								
112M		4.00	S342		B95			95											858						820										
132S		5.50		S383		B95		132											450							540		400	140	240	440	932	820	M20x400	
132S		7.50	158		490			600											440							160		1050	920						
160M		11.00	S383	163	450	660		400		180	280							505	1232						1140										
050250	160M	11.00	S383	B80	57	172	50	65		100	490					600	440	160	75	260	485		1112	1000	M24x400										
	160M	15.00				216																	740	490		170	1174								
	160L	18.50	S434	B110		229																	540	660		490	200	280	505	1232	1140				
	180M	22.00				296																	540	660		490	200	280	505	1232	1140				
	200L	30.00	S435	B125		296			540														660	490	200	280	505	1232	1140						
065125	100L	3.00	S342	B80	39	99			50		65		100	450		540	400	140		60	240	420	835	820	M20x400										
	112M	4.00				100																	856	932											
	132S	5.50				S383																	B95			128	490	600	440	160	1050	920			
	132S	7.50																								134	540	600	440	160	1050	920			
	065160	132S				5.50						S383											B95	45	160	50	65	100	490	600	440	160	75	260	485
132S		7.50	207	540	660	490	200	280						530		1222	1140																		
160M		11.00	220	540	660	490	200	280						530		1222	1140																		
065200	160M	15.00	S434	B110	48	220	50	65				100		540		740	490	200	90		280	530	1222	1140	M24x400										
	160M	15.00				287																	540	740											
	160L	18.50				244																	540	740					490	200	280	530		1222	1140
	180M	22.00				257			540		740				490					200			280	530					1222	1140					
	200L	30.00				S435			B95		244				540					740			490	200	280				530	1222	1140				
065250	160L	18.50	S435	B95	78	257			50		65			100	540	740	490	200		90	280	530	1222	1140	M24x400										
	180M	22.00				257																	540	740					490	200	280	530		1222	1140
	200L	30.00	S436	B125		324																	540	740		490	200		280	530	1222	1140			
	200L	37.00				401				540													740	490		200	280		530	1222	1140				
	225M	45.00	S486	401		540				740													490	200	280	530	1222		1140						
080160	132S	7.50	S383	B95	51	147	50	65		100					490	600	440	160	75		260	485	957	920	M20x400										
	160M	11.00				166																	1137	1000											
	160M	15.00				210																	1199			1140									
	160L	18.50				223							1185										1247				1309								
	080200	160M				15.00							S434										B110	71	202	50	65		100	540	740	490	200	90	280
160L		18.50	237	1309	1367	1270																													
180M		22.00	250	1367	1270																														
200L		30.00	317	1367	1270																														
200L		37.00	S436	B125	317	1367			1270																										
080250	180M	22.00	S486	B110	84	282			50		65		100		610	840	550	205		90	300	580	1309	1250	M24x400										
	200L	30.00				342	1309	1367				1250																							
	200L	37.00				407	1309	1367				1250																							
	225M	45.00				629	1309	1367				1250																							
	250M	55.00				S607	B140	629				1309							1367				1250												
100160	160L	18.50	S435	B95	80	246	50	65				100			540	740	490	200	90		280	560	1247	1140	M20x400										
	180M	22.00				259								1309									1367	1270											
	200L	30.00				326								1309									1367	1270											
	200L	37.00				326								1309									1367	1270											
	100200	160L				18.50								S436									B125	79	245	50	65	100		540	740	490	200	90	280
180M		22.00	258	1309	1367	1270																													
200L		30.00	325	1309	1367	1270																													
200L		37.00	402	1309	1367	1270																													
225M		45.00	S486	B125	402	1309			1367	1270																									
100250	200L	30.00	S607	B140	89	347			50	65	100			610	840	550	205	90		325	605	1382	1250	M24x400											
	200L	37.00				412	1382	1412																											
	225M	45.00				634	1382	1412																											
	250M	55.00				903	1382	1412																											
	280S	75.00				S609A	B160	903											1382			1412													
280M	90.00	966	1382	1412																															
125200	250M	55.00	S607	B140	102	647	125	150					140	730	940	670	230		90	350	665	1542	1400	M24x400											
	280S	75.00	S609A	B160		916																1542	1400												
	280M	90.00	966	1542		1400																													

* Motor protection type IP 55, dimensions depend on the motor manufacturer.
Some sizes are not corresponding to the drawing in small details.
Foundation plan for 60 Hz on request



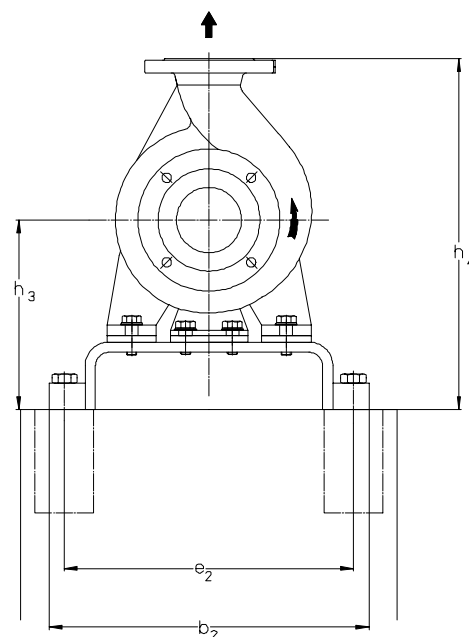
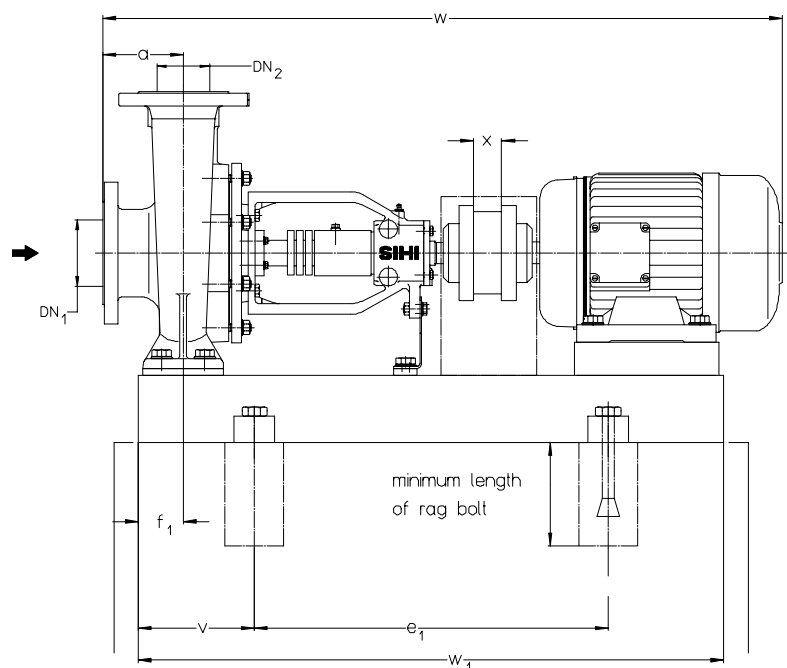
Dimensions in mm.

Dimensional tolerances admissible (base plates) for welded parts according to DIN 8570 B

size	motor		base-plate No.	coupling **	weight		DN ₂	DN ₁	a	b ₂	e ₁	e ₂	v	f ₁	h ₃	h ₄	x	w*	w ₁	rag bolt DIN 529														
032125	71	0.25	S241	H80	32	63	32	50	80	330	480	290	125	60	177	317	100	780	730	M16x200														
	71	0.37	S301			390				350	197	357																						
032160	71	0.37	S272		41	76				360	540	320	140		225	405		814	820															
	80	0.55				80															83													
032200	80	0.55			39	78			105					100				490	600		440	160	75	260	485	834	920	M20x400						
	80	0.75				108																												
	90S	1.10				110																												
032250	90L	1.50	S383		52	120			490	600	440	160	75	260	485	892		920	M20x400															
	80	0.75				110																												
	90S	1.10				120																												
100L	2.20	120																																
040125	71	0.25	S241	H80	34	65	40	65	80	330	480	290	125	60	177	317	100	780	730	M16x200														
	71	0.37	S272			360				540	320	140	197		357	814					820													
040160	80	0.55	S301		39	74				360	480	350	125		240	420		872	820															
	80	0.55	78			140															75	260	485	305	555	1068	1000							
	80	0.75	81						100					450														400	170	305	555	1089	1140	
90S	1.10	89	490		600													440	160															260
040200	80	0.55								43	92	540	600																					
	80	0.75				94			125		540			660	490	170				305								555	1068	1000				
	90S	1.10	113		87	171												540	660		490	170	305	555	1068	1000								
040250	90L	1.50	57							115		540	600														440				160	260	485	892
	100L	2.20							125	87	171			540	660	490				170								305	555	1068				
	100L	3.00			125	87			171									540	660		490	170	305	555	1068	1000								
040315	100L	2.20	S434		87							171	540														660				490	170	75	260
	100L	3.00								172	125	540		660	490	170				305								555	1068	1000				
	112M	4.00		172		125	540	660	490	170							305	555	1068		1000													
132S	5.50	207	125	540	660								490									170	305	555	1068	1000								
050125	71	0.37									S301	H80		35	70	50				65							100	390	480	350	125	60	197	357
	80	0.55				S272	360	320	140	197	357				834		820																	
	050160	80	0.75	S342	44	90	450	540	400	140	240		440	892	820																			
80		0.55	93			75											260	485	892		920	M20x400												
80		0.75	89																				125	490	600	440	160	260	485	892	920			
90S	1.10	92	112M		4.00									S434	H95																	90	210	213
050200	90S	1.10					43	94	490	600																								
	90L	1.50		104		125		490			600		440				160	260	485		892	920												
	100L	2.20	115	57	125									490	600								440	160	260	485	892	920						
050250	90L	1.50	S383				57		126	125																			490	600	440	160	260	485
	100L	2.20				175		125	490		600		440				160	260	485		892	920												
	100L	3.00		210	125	490								600	440								160	260	485	892	920							
050315	112M	4.00	S434	90			175			125																		490	600	440	160	260	485	892
	132S	5.50					210	125	490		600		440				160	260	485		892	920												
	132M	7.50			213	125	490					600		440	160	260				485			892	920										

Foundation plan for units with spacer type coupling
n = 1450 rpm

size	motor		base plate No.	coup- ling **	weight		DN ₂	DN ₁	a	b ₂	e ₁	e ₂	v	f ₁	h ₃	h ₄	x	w*	w ₁	rag bolt DIN 529																																			
	size	kW			pump kg	unit kg																																																	
065125	80	0.55	S342	H80	39	85	65	80	100	450	540	400	140	60	240	420	100	834	820	M20x400																																			
	80	0.75				88												892																																					
	90S	1.10				91												834																																					
065160	80	0.75			45	94												440			892																																		
	90S	1.10				96															933																																		
	90L	1.50				106																																																	
	100L	2.20	104																																																				
	100L	3.00	106																																																				
065200	90S	1.10	48		116	485				490	600	440	160	75	260	485	932	920	994		1000	1140	M24x400																																
	90L	1.50																						162																															
	100L	2.20																						163																															
	100L	3.00																						198																															
	112M	4.00																		233																																			
065250	100L	2.20	S434	78	94	236				540	660	490	170	90	280	530	1083	1000	1104	1180	1205	1231	1323	1385																															
	100L	3.00				252																																																	
	112M	4.00				282																																																	
065315	132S	5.50	S486	H95	94	282				610	840	550	205	325	605	899	957	998	1067	1108	1129	1205	1231	1323	1385																														
	132M	7.50				282																																																	
	160M	11.00				282																																																	
	160L	15.00				282																																																	
	160L	15.00				282																																																	
080160	80	0.75	S383	H80	51	104	80	100	125	490	600	440	160	75	260	485	140	899	920	M20x400																																			
	90S	1.10				107												957																																					
	90L	1.50				109												998																																					
	100L	2.20				119												1067																																					
	100L	3.00				144												1108																																					
080200	90L	1.50	S434		71	155												540			660	490	170	90	280	510	1067	1108	1129	1205	1231	1323	1385	1400	1462																				
	100L	2.20																																		156	1129																		
	100L	3.00																																		191	1205																		
	112M	4.00								194	1231																																												
	132S	5.50								195	1205																																												
080250	100L	3.00	S486		H95	84				223	610	840	550	205	300	580	1108	1129	1205		1231	1323	1385	1400	1462																														
	112M	4.00								226																1205																													
	132S	5.50								243										1231																																			
	132M	7.50		246						1205																																													
	132S	5.50		262						1231																																													
080315	132M	7.50	S486	H95	104	262				610	840	550	205	350	665	1108	1129	1205	1231	1323	1385	1400	1462																																
	160M	11.00				292																		1205																															
	160L	15.00				292																		1231																															
	160L	15.00				292																		1205																															
	160L	15.00				292																		1231																															
100160	100L	2.20	S434	H80	80	164				100	125	140	540	660	490	170	90	280	560	140	1108	1000	M20x400																																
	100L	3.00				165	1129																																																
	112M	4.00				200	1205																																																
	132S	5.50				200	1231																																																
	100L	2.20				163	1205																																																
100200	100L	3.00	S434	H80	79	163	540	660	490												170			90	280	560	140	280	560	140	1108	1000	M20x400																						
	112M	4.00				164																									1129																								
	132S	5.50				199																									1205																								
	132M	7.50				202							1231																																										
	100L	2.20				200							1205																																										
100250	112M	4.00	S486	H80	89	200	610	840	550				205	325	605	1144	1220	1246	1338	1400	1462	1250		M24x400																															
	132S	5.50				228																			1220																														
	132M	7.50				231																	1246																																
	160M	11.00				247																	1338																																
	160M	11.00				264																	1400																																
100315	160L	15.00	S486	H110	106	294	610	840	550				205	350	665	1400	1462	1250	1400	1462	1250	M24x400																																	
	180M	18.50				306																	1220																																
	180L	22.00				323																	1246																																
	132M	7.50				244																	1246																																
	160M	11.00				260																	1338																																
125200	160L	15.00	S486	H110	102	290	125	150	160				730	670	205	110	380	780	1400	1423	1400		M24x400																																
	132M	7.50				251				1400																																													
	160M	11.00				267				1423																																													
	160L	15.00				297				1482																																													
	132M	7.50				279				1482																																													
125250	160M	11.00	S486	H95	109	260				610	840	550								205	230			110	380	780	1400	1482	1400	M24x400																									
	160L	15.00				290																						1482																											
	132M	7.50				251																1482																																	
	160M	11.00				267																1482																																	
	160L	15.00				297																1482																																	
150200	132M	7.50	S605	H95	120	279				150	200	160								730	670	205		110	380	780	1400	1482	1400		M24x400																								
	160M	11.00				306																						1482																											
	160L	15.00				337																	1482																																
	180M	18.50				349																	1482																																
	180L	22.00				351																	1482																																
150250	180M	18.50	S606	H110	134	363																	610					840	550			205	230	110	380	780	1400	1482	1400	M24x400															
	180L	22.00				392																																1482																	
	200L	30.00				436																								1482																									
	150315																																																						
	150400																																																						
150500																																																							
200250																																																							
200315																																																							
200400																																																							
200500																																																							



Dimensions in mm.

Dimensional tolerances admissible (base plates) for welded parts according to DIN 8570 B

size	motor		base plate No.	coup- ling **	weight		DN ₂	DN ₁	a	b ₂	e ₁	e ₂	v	f ₁	h ₃	h ₄	x	w*	w ₁	rag bolt Din 529					
size		kW			pump kg	unit kg																			
032125	71	0.55	S241	H80	32	64	32	50	80	330	480	290	125	60	177	317	100	780	730	M16x200					
	80	0.75	S272			72				360	540	320	140					814	820						
	80	1.10				75												872							
	90S	1.50				77												814							
	90L	2.20				80												872							
032160	80	1.10	S272	41	80	390				600	350	160	197		357	814		920							
	90S	1.50			83											913									
	90L	2.20			85											934									
	100L	3.00			95											993									
	112M	4.00	96	1012																					
	132S	5.50	S303	H95	98	1012			920																
	132S	7.50																							
032200	90L	2.20	S272	H80	39	83			360	540	320	140	225	405	872	820									
	100L	3.00				93									913										
	112M	4.00				94									934										
	132S	5.50				127									1010										
	132S	7.50	S303	H95	158	450			660	400	180	240	420	1128	1020										
	160M	11.00												203		1190									
	160M	15.00												S344		203		1140							
	160L	18.50												S385		203		1140							
032250	132S	7.50	S383	H95	52	149	100	490	740	440	200	75	260	485	1030	920	M20x400								
	160M	11.0	S434			184									1148										
	160M	15.0																							
040125	80	1.10	S272	H80	34	73	40	65	80	360	540	320	140	60	177	317	100	814	M16x200						
	90S	1.50				76												872							
	90L	2.20				78												913							
	100L	3.00				88												872							
	90S	1.50				81												913							
040160	90L	2.20	S272	H80	39	83				390	600	350	160		197	357		872							
	100L	3.00				93												913							
	112M	4.00				94												934							
	132S	5.50				127												1010							
	132S	7.50	S303	H95	162	993																			
	160M	11.00	S344	162	1128																				
	160M	15.00																							
040200	100L	3.00	S342	H80	43	104			100	450	660	400	140	240	420	933		820	M20x400						
	112M	4.00				105										954									
	132S	5.50				131										1030									
	132S	7.50				S303										131				1148					
	160M	11.00	S344	160	1148																				
040250	160M	15.00	S383	H95	57	154			100	490	600	440	160	75	260	485		1030	920	M20x400					
	132S	7.50				S383												189			1148				
	160M	11.00				S434												219			1210				
	160M	15.00																							
	160L	18.50	S385																						

Foundation plan for units with spacer type coupling

n = 2900 rpm

size	motor		base plate No.	coup-ling **	weight		DN ₂	DN ₁	a	b ₂	e ₁	e ₂	v	f ₁	h ₃	h ₄	x	w*	w ₁	rag bolt DIN 529																		
	size	kW			pump kg	unit kg																																
050125	90S	1.50	S272	H80	35	77	50	65	100	360	540	320	140	60	197	357	100	892	820	M16x200																		
	90L	2.20	79			361				600	325	160	182		342	933		920	M12x100																			
	100L	3.00	89			390				350	197	357	954		1030	M16x200																						
	112M	4.00	90			450				540	400	140	240		420	892			820	M20x400																		
	132S	5.50	S303	H95		106				390	600	350	160		225	405		933		954	M20x400																	
050160	90L	2.20	S342	H80	44	95				65	80	125	75	260	485	75	260	485		100	1148	1020	M20x400															
	100L	3.00				105													450		540	400		140	240	440	933	820	M20x400									
	112M	4.00				106													490		740	440		200	240	440	954		1030	920	M16x200							
	132S	5.50	S303	H95		132													390		600	350		160	225	425	1030		920	M16x200								
	132S	7.50				161													450		660	400		180	240	440	1148	1020	M20x400									
050200	160M	11.00	S344	H95	43	160							65	80	125	75	260	485	75	260	485	100	1148	1020	M20x400													
	100L	3.00	104			450																	540	400		140	240	440	933	820	M20x400							
	112M	4.00	105			490																	740	440		200	240	440	954		1030	920	M16x200					
	132S	5.50	S303			H95																	131	390		600	350	160	225		425	1030	920	M16x200				
	132S	7.50																					160	450		660	400	180	240	440	1148	1020	M20x400					
050250	160M	11.00	S434	H95	57	189										65	80	125	75	260	485	75	260	485	100	1148	1000	M20x400										
	160M	15.00	219			490																				740	440		200	240	440	933	820	M20x400				
	160L	18.50	238			490																				740	440		200	240	440	954		1030	920	M16x200		
	180M	22.00	S435			H110																				299	540		660	490	170	225		425	1030	920	M16x200	
	200L	30.00																								299	540		660	490	170	225	425	1030	920	M16x200		
065125	100L	3.00	S342	H80	39	100	65	80	125										75	260	485	75	260	485	100	1148	1020	M20x400										
	112M	4.00	101			450																				540	400		140	240	440	933	820	M20x400				
	132S	5.50	S383			H95																				136	490		600	440	160	240		440	954	1030	920	M16x200
	132S	7.50																								142	450		660	400	180	240		440	1148	1020	M20x400	
	065160	132S	5.50	S344		H95																				45	162		65	80	125	75	260	485	75	260	485	100
132S		7.50	182		490					600	440	160							240	440	933	820	M20x400															
160M		11.00	210		450					660	400	180							240	440	1148		1020	M20x400														
160M		15.00	S385	H110	229	490				740	440	200							240	440	954		1030	920	M16x200													
160L		18.50			297	540				660	490	170							225	425	1030	920	M16x200															
065200	180M	22.00	S435	H110	48	297				65	80	125							75	260	485	75	260	485	100	1148	1020	M20x400										
	200L	30.00	252			490							600	440	160											240	440					933	820	M20x400				
	160L	18.50	S436			H95							266	490	740											440	200					240		440	954	1030	920	M16x200
	180M	22.00											362	540	660											490	170					225		425	1030	920	M16x200	
	200L	30.00	S487			H125							445	490	740											440	200					240	440	954	1030	920	M16x200	
200L	37.00	445		490	740								440	200	240				440	954	1030	920	M16x200															
065250	225M	45.00	S607	H125	78	445							65	80	125	75	260	485	75	260	485	100	1148	1020	M20x400													
	200L	30.00	445			490																	600	440		160	240	440				933	820	M20x400				
	200L	37.00	445			490																	600	440		160	240	440				933		820	M20x400			
	225M	45.00	S607			445																	490	600		440	160	240				440			933	820	M20x400	
	250M	55.00	S607			445																	490	600		440	160	240				440	933		820		M20x400	
080160	132S	7.50	S434	H95	51	164	65	80	125							75	260	485	75	260	485	100	1148	1020	M20x400													
	160M	11.00	165			490																	600	440		160	240	440				933	820	M20x400				
	160M	15.00	S385			H110																	213	490		600	440	160				240		440	933	820	M20x400	
	160L	18.50																					232	490		600	440	160				240		440	933		820	M20x400
	180M	22.00	S435			244																	490	600		440	160	240	440	933	820	M20x400						
080200	160M	15.00	H95	71	210	65										80	125	75	260	485	75	260	485	100	1148	1020	M20x400											
	160L	18.50			244																				490	600		440	160	240		440	933	820	M20x400			
	180M	22.00			S436																				H110	258		490	600	440	160	240	440		933	820	M20x400	
	200L	30.00																								354		490	600	440	160	240	440		933		820	M20x400
	200L	37.00			S487					H125	354	490													600	440		160	240	440	933	820	M20x400					
080250	180M	22.00	S486	H110	84					284	65	80						125	75	260	485	75	260	485	100	1148	1020	M20x400										
	200L	30.00	368							490																600	440		160	240	440		933	820	M20x400			
	200L	37.00	S487							H125																451	490		600	440	160	240	440		933	820	M20x400	
	225M	45.00																								651	490		600	440	160	240	440		933		820	M20x400
	250M	55.00	S608							H140																651	490		600	440	160	240	440	933	820			M20x400
100160	160L	18.50	S436	H95	80					254			65	80	125				75	260	485	75	260	485	100	1148	1020	M20x400										
	180M	22.00	268							490																600	440		160	240	440	933	820	M20x400				
	200L	30.00	S487							H125																364	490		600	440	160	240		440	933	820	M20x400	
	200L	37.00																								364	490		600	440	160	240		440	933		820	M20x400
	225M	45.00	S607							H125																446	490		600	440	160	240	440	933	820			M20x400
100200	200L	30.00	H125	79	446		65	80	125	75									260	485	75	260	485	100	1148	1020	M20x400											
	200L	37.00			373																				490	600		440	160	240	440	933	820	M20x400				
	225M	45.00			S607																				H140	456		490	600	440	160	240		440	933	820	M20x400	
	250M	55.00																								656		490	600	440	160	240		440	933		820	M20x400
	280S	75.00			S609A																				H160	909		490	600	440	160	240	440	933	820			M20x400
280M	90.00	S609A	H160	959	490	600				440						160	240		440	933	820	M20x400																
125200	250M	55.00	S608	H140	102	669				65						80	125		75	260		485	75	260	485	100	1148	1020	M20x400									
	280S	75.00	922			490																					600	440		160	240	440	933	820	M20x400			
	280M	90.00	972			490															600						440	160		240	440	933	820		M20x400			
	280S	75.00	S609A			H160															922						490	600		440	160	240			440	933	820	M20x400
	280M	90.00	S609A			H160					972	490						600			440						160	240		440	933	820		M20x400				

Data regarding pump size

Type + Pump size	Hydraulics + Bearing	Shaft sealing	Material	Casing gasket
	A♦ hydraulic A B♦ hydraulic B D♦ transnorm size with double volute ♦A one ball bearing respectively two inclined ball bearing grease lubricated and one liquid flushed sleeve bearing	002 radial shaft seal rings GBC unbalanced standard mechanical seal	1B main parts of sperodial cast 2B main parts of cast steel	2 confined flat gasket of graphite with A4 insertion
ZTND	032125			
	032160			
	032160			
	032200			
	032200			
	032250			
	040125			
	040160			
	040200			
	040250			
	040315			
	050125			
	050160			
	050200			
	050250			
	050315			
	065125			
	065160			
	065200			
	065250			
	065315			
	080160			
	080200			
	080250			
	080315			
	100160			
	100200			
	100250			
	100315			
	125200			
	125250			
	150200			
	150250			
	150315			
	150400			
	150500			
	200250			
	200315			
	200400			
	200500			
	AA	alternatively 002 GBC	1B	2
	DA		2B	

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www.sterlingfluidsystems.com

Europe

www.sterlingfluidsystems.com/europe

Sterling Fluid Systems (Austria)

Wien
Telephone: +43 (0)1 680 050
Fax: +43 (0)1 680 0521
E-Mail: sales_austria@sterlingsihi.de

Sterling Fluid Systems (France)

Trappes
Telephone: +33 (0)1 34 82 39 00
Fax: +33 (0)1 34 82 39 61
E-Mail: sterlingsihi@easynet.fr

Sterling Fluid Systems (Greece)

Athens
Telephone: +30 (0) 210 957 07 83
Fax: +30 (0) 210 956 81 21
E-Mail: sales_greece@sterlingsihi.de

Sterling Fluid Systems (Netherlands)

Beverwijk
Telephone: +31 (0)251 263 232
Fax: +31 (0)251 226 309
E-Mail: info@sihi.nl

Sterling Fluid Systems (Schweiz)

Schaffhausen
Telephone: +41 (0)52 6440606
Fax: +41 (0)52 6440616
E-Mail: info@sterlingfluid.ch

Sterling Fluid Systems (Belgium)

Groot-Bijgaarden
Telephone: +32 (0)2 481 7711
Fax: +32 (0)2 481 7737
E-Mail: sales@sterlingfluidsystems.be

Sterling SIHI (Germany)

Itzehoe
Telephone: +49 (0)4821 77101
Fax: +49 (0)4821 771274
E-Mail: sales@sterlingsihi.de

Sterling Fluid Systems (Hungary)

Veszprém
Telephone: +36 (0)88 40 66 33
Fax: +36 (0)88 40 66 35
Mail: sales_hungary@sterlingsihi.de

Sterling Fluid Systems (Polska)

Warszawa
Telephone: +48 (0) 22 849 7097
Fax: +48 (0) 22 849 6726
E-Mail: sterling@sterling.pl

Sterling Fluid Systems (Spain)

Madrid
Telephone: +34 91 709 1310
Fax: +34 91 715 9700
E-Mail: mibsa@stnet.es

Sterling Fluid Systems (Czech Republic)

Olomouc
Telephone: +420 (0) 68 551 6651
Fax: +420 (0) 68 551 6653
E-Mail: sterling@sterling.cz

Sterling SAT

Dägeling
Telephone: +49 (0) 4821 9000-0
Fax: +49 (0) 4821 9000-501
E-Mail: sat@sterlingsat.com

Sterling Fluid Systems (Italy)

Cologno Monzese
Telephone: +39 02 82 41
Fax: +39 02 82 24 220
E-Mail: sterlingitaly@sidro.it

Sterling Fluid Systems (Romania)

Bucuresti
Telephone: +40 (0) 21 610 7188
Fax: +40 (0) 21 210 8287
E-Mail: sales_romania@sterlingsihi.de

Sterling Fluid Systems (UK)

Altrincham/Cheshire
Telephone: +44 (0)161 9286371
Fax: +44 (0)161 9252129
E-Mail: uksales@sterlingfluid.com

Americas

www.sterlingfluidsystems.com/americas

Sterling Fluid Systems (USA)

Grand Island
Telephone: (1) 716 773 6450
Fax: (1) 716 773 2330
E-Mail: mail@sihi.com

Sterling Fluid Systems (Canada)

Guelph
Telephone: (1) 519 824 4600
Fax: (1) 519 824 7250
E-Mail: mail@sihi.com

Asia

www.sterlingfluidsystems.com/asia

Sterling Fluid Systems (Asia)

Singapore
Telephone: (65) 6863 0828
Fax: (65) 6863 0868
E-Mail: asia.marketing@sterlingasia.com

SIHI (Australia)

Bayswater
Telephone: (61) 3 9720 1500
Fax: (61) 3 9720 4076
E-Mail: sfsaus@ozemail.com.au

Sterling Fluid Systems (China)

Shanghai
Telephone: (8621) 6336 3488
Fax: (8621) 63268487
E-Mail: info.china@sterlingasia.com

Sterling Fluid Systems (Malaysia)

Selangor Darul Ehsan
Telephone: (60) 3 8070 0198
Fax: (60) 3 8070 0204
E-Mail: sfsmsia@tm.net.my

Sterling Fluid Systems (Philippines)

Muntinlupa City
Telephone: (63) 2 809 4908
Fax: (63) 2 807 2013
E-Mail: philippines@pacific.net.ph

Sterling Fluid Systems (Thailand)

Bangkok
Telephone: (66-2) 319 2567
Fax: (66-2) 319 2573/4
E-Mail: sfsthai@sterlingthai.co.th