

# NSI

## NORMA CENTRIFUGALNE PUMPE

prema ISO2858 (DIN24256)  
*NORM CENTRIFUGAL PUMPS*  
according to ISO2858 (DIN24256)



## TEHNIČKE KARAKTERISTIKE

Broj obrtaja: 1450 o/min  
 Max. protok: 1÷350 l/s  
 Visina dizanja: 3÷90 m  
 Broj obrtaja: 2900 o/min  
 Max. protok: 1÷130 l/s  
 Visina dizanja: 10÷150 m  
 Temperatura: do 140 °C  
 Zaptivanje: pletenicom ili mehaničkom zaptivkom

## PRIMENA

NSI pumpe namenjene su za crpljenje hladne i tople vode do 140 °C, nečiste vode, morske vode, kondenzata, ulja, lužina, te abrazivnih tečnosti bez većeg sadržaja krutih čestica. U zavisnosti od materijalnog izvođenja nalaze primenu u hemijskoj, petrohemijskoj i farmaceutskoj industriji, industriji boja, papirnoj industriji, rashladnim sistemima i toplifikaciji.

## OPIS IZVOĐENJA

Jednostepene norma centrifugalne pumpe sa spiralnim kućištem su u pogledu dimenzija i karakteristika izvedene prema internacionalnom standardu ISO 2858/ DIN 24256. Spiralno kućište je izvedeno sa nosećim stopama. Aksijalna sila je uravnotežena hidraulički pomoću otvora između lopatica, koje takođe vrše rasterećenje zaptivača. Procesno izvođenje dozvoljava demontažu kompletnog kućišta ležaja sa rotirajućim sklopom prema pogonskom motoru s tim da kućište pumpe ostaje montirano na cevovodu. Upotrebom spojnice sa međukomadom, nije potrebno pomerati motor kod demontaže pumpnog hidrauličnog dela, čime se izbegava ponovno centriranje. Zamene standardnih pumpi moguće je vršiti pumpama bilo kojeg proizvođača bez ikakvih prepravki i dorada priključaka i postolja i uz zadržavanje istog pogonskog motora. Pri tome će iste veličine pumpi ostvariti približno iste hidrauličke parametre (Q i H).

## POGONSKI PRITISCI

Maksimalno 16 bara, u zavisnosti od materijalnog izvođenja.

## POLOŽAJ PRIKLJUČAKA

Usisni priključak je horizontalan, a potisni vertikalni.

## PRIRUBNICE

DIN 2533 NP16 kod materijalnog izvođenja od SL-a, DIN 2633 NP16 kiselo otporno izvođenje od ČL 4574 i ČL 0401. Na poseban zahtev mogu se izvesti prirubnice za pritiske više od navedenih.

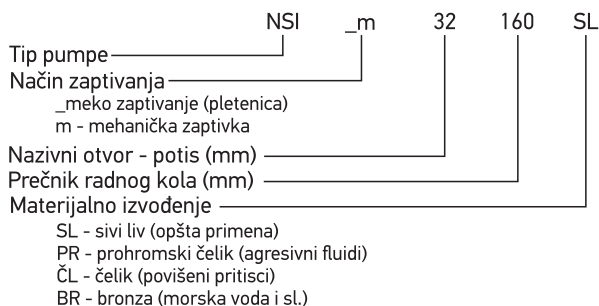
## ULEŽIŠTENJE

U standardnom izvođenju na pumpnoj i pogonskoj strani ugrađen je po jedan radijalni ležaj, podmazivan uljem, a u posebnim slučajevima jedan valjkasti ležaj na pumpnoj strani i dva radijalno-aksijalna ležaja na pogonskoj strani, takođe podmazivani uljem. Nivo ulja vidljiv je na pokazivaču nivoa, pa ga je prema potrebi lako doliti kroz otvor za nalivanje.

## ZAPTIVANJE

Zaptivanje vratila vrši se pomoću zaptivnih pletenica ili pomoću mehaničkog zaptivača. Eventualna naknadna ugradnja elemenata mehaničkog zaptivača kod pumpi čije se zaptivanje vrši pomoću zaptivnih pletenica nije uslovljeno izmenom njenih osnovnih delova, već samo zamenom pojedinih delova.

## NAČIN OZNAČAVANJA



## FEATUERS

Speed: 1450 r.p.m.  
 Capacity: 1÷350 l/s  
 Total head: 3÷90 m  
 Speed: 2900 r.p.m.  
 Capacity: 1÷130 l/s  
 Total head: 10÷150 m  
 Temperature: up to 140°C  
 Sealing: packing or by mechanical seal

## USES

NSI pumps are suitable for transport of cold and hot water up to 140 °C, unclean water, salt water, condensates, oils, alkalies, abrasive liquids without high content of solid particles. Depending on the design /performance, can be used in chemical, petrochemistry and pharmaceutical industry, color industry, paper industry, cooling and heating systems.

## PERFORMANCE

In terms of size and characteristics, single stage norm centrifugal pumps with a volute casing are made according to standard ISO 2858/ DIN 24256. The volute casing is made with feet. The axial force is balanced by means of hydraulic hole between the blades, which also reduce the workload of the sealant. Process performance permits dismantling of the complete bearing bracket with a rotating drive motor assembly if the pump casing remains mounted on the pipeline. By using couplings with the intermediate element, it is not necessary to move the motor when removing the pump hydraulic part, thus avoiding the re-centering. Substitution of standard pumps can be carried out by pumps of any manufacturer without any alteration of processing terminal and the base and with maintaining the same drive motor. If doing so, the same pump sizes achieve approximately the same hydraulic parameters (Q and H).

## OPERATING PRESSURES

Maximum 16 bar, depending of design /performance.

## POSITION OF CONNECTION

Suction connection is horizontal, and delivery is vertical.

## FLANGES

DIN 2533 NP16 at performance of grey casting, DIN 2633 NP16 at sour resistant performance of AISI316 and EN10293. Flanges for pressures higher than indicated can be made on special request.

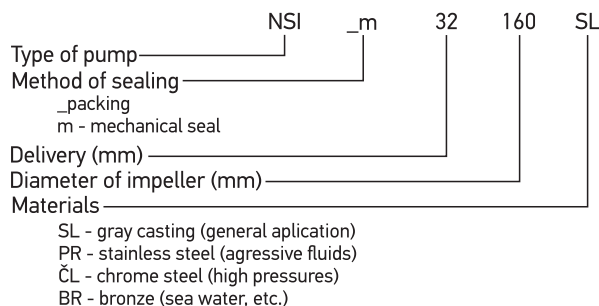
## BEARING

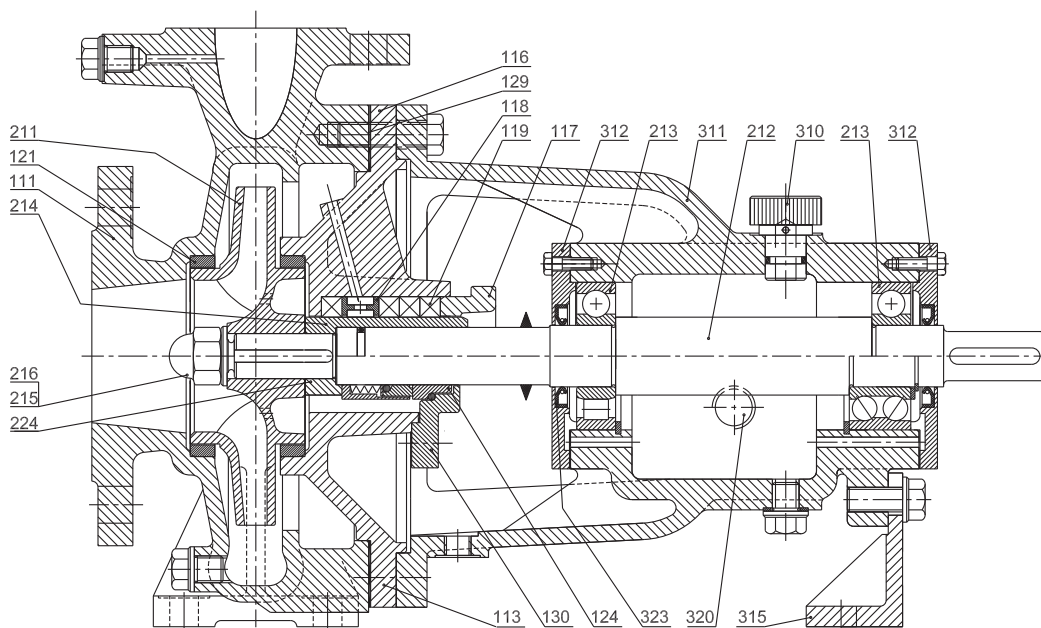
In the standard design at the pump and drive side a single radial bearing is built on, lubricated by oil, and in special cases a roller bearing on the pump side and two radial-axial bearings on the drive side, also lubricated with oil. The oil level is visible on the level display, and if necessary it is easy to top it up through the filling hole.

## SEALING

Sealing of the shaft is possible by packing or by mechanical seal. Any additional installation of mechanical seals elements for pumps whose sealing is performed using packings does not cause its basic parts to be changed, but only the replacement of certain parts.

## METHOD OF MARKING



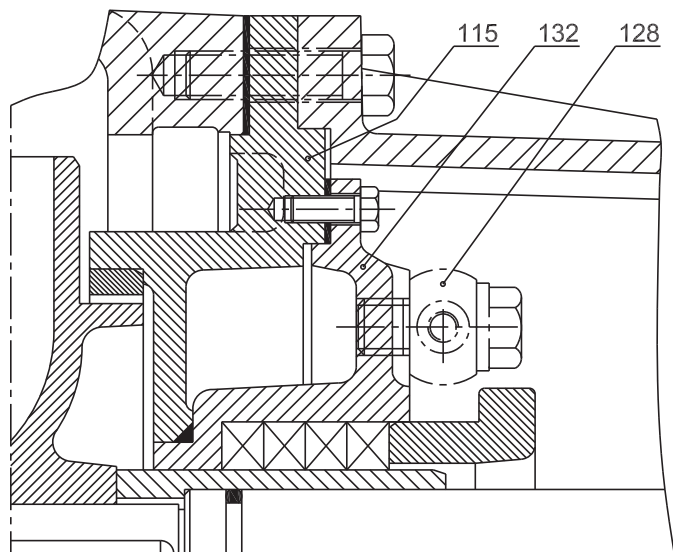


Opšta primena-zaptivanje, pletenicom ili mehaničkom zaptivkom  
 General application-sealing, packing or mechanical seal

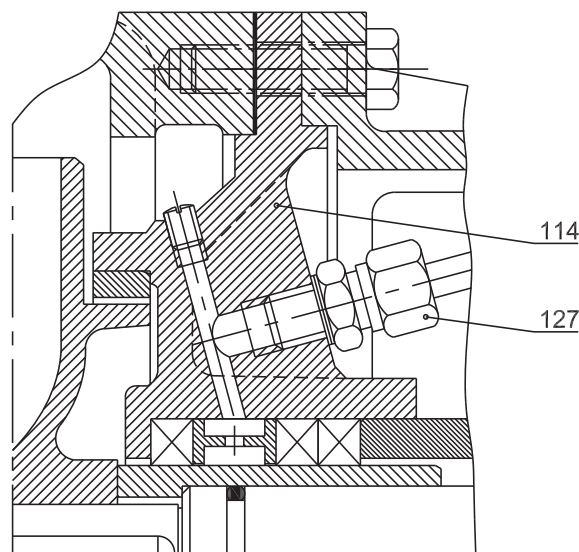
Pozicija	Naziv	Pozicija	Naziv	Item	Part name	Item	Part name
111	Spiralno kućište	132	Nosač pletenice	111	Volute casing	132	Stuffing box
**113	Poklopac kućišta	211	Radno kolo	**113	Casing cover	211	Impeller
114	Poklopac kućišta	212	Vratilo	114	Casing cover	212	Shaft
115	Poklopac kućišta	213	Ležaj	115	Casing cover	213	Bearing
*116	Poklopac kućišta	*214	Zaštitna čaura	*116	Casing cover	*214	Protection sleeve
*117	Pritezač pletenice	215	Navrtka	*117	Gland	215	Nut
*118	H-prsten	216	Podloška	*118	H ring	216	Washer
*119	Zaptivna pletenica	**224	Distantna čaura	*119	Packing	**224	Spaced sleeve
121	Procepni prsten	310	Čep	121	Wear ring	310	Plug
**124	Mehanička zaptivka	311	Kućište ležaja	**124	Mechanical seal	311	Bearing bracket
127	Priključak	312	Poklopac ležaja	127	Connection	312	Bearing cover
128	Priključak	315	Noga kućišta ležaja	128	Connection	315	Bearing bracket foot
129	Zaptivka	320	Pokazivač nivoa ulja	129	Sealing	320	Oil level indicator
**130	Poklopac mehaničke zaptivke	323	Semering	**130	Mechanical seal cover	323	Seal

\* Izvođenje sa pletenicom  
 \*\* Izvođenje sa mehaničkom zaptivkom

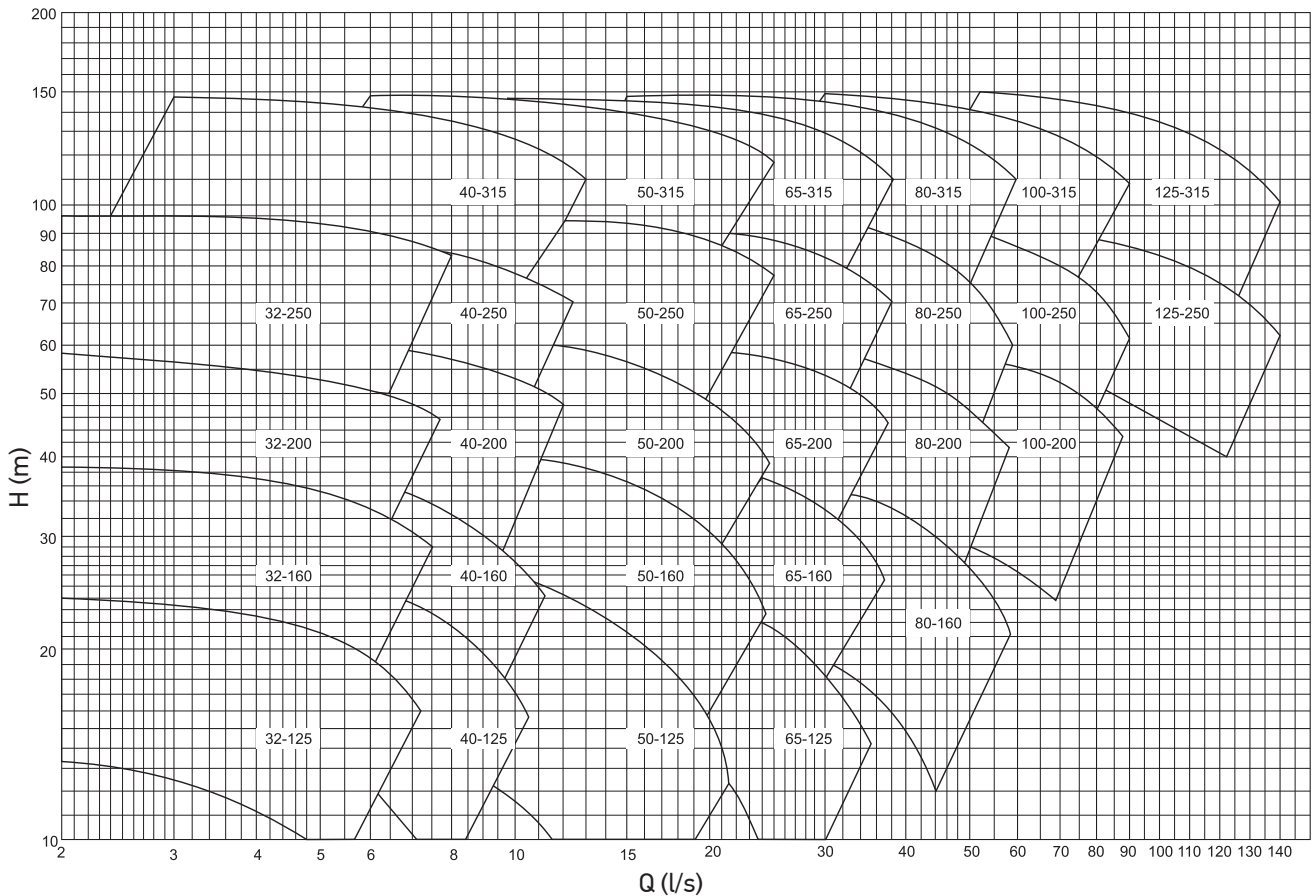
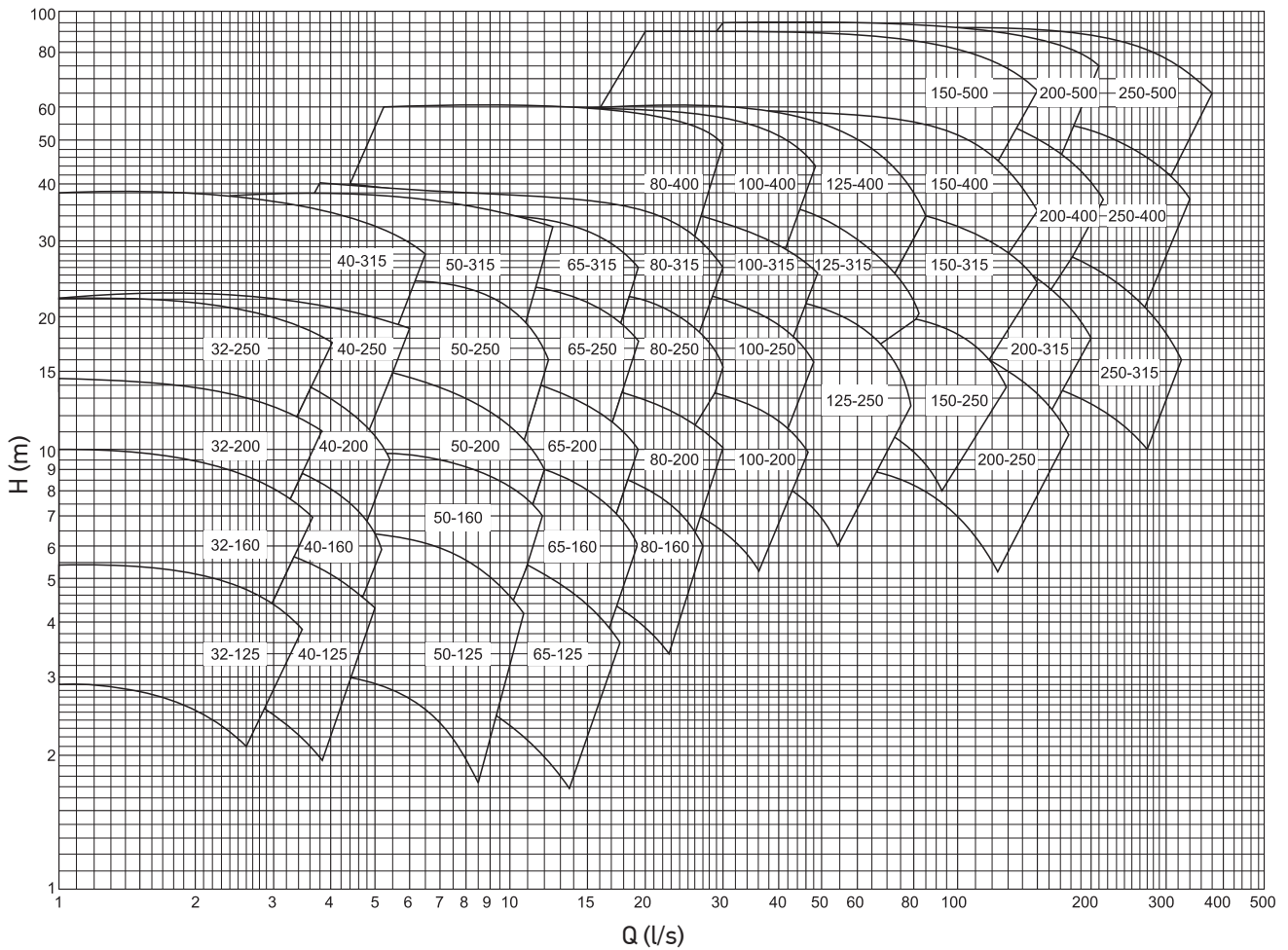
\* Performance with packing  
 \*\* Performance with mechanical seal



Primena za medije sa povišenom temperaturom, sa hlađenjem  
 Application for media with a high temperature, with cooling



Primena za nečiste medije, sa ispiranjem  
 Application for impure media, with rinsing



## MATERIJALI IZRADE

U tabeli su navedeni materijali izrade važnijih delova pumpe odgovarajućeg materijalnog izvođenja.

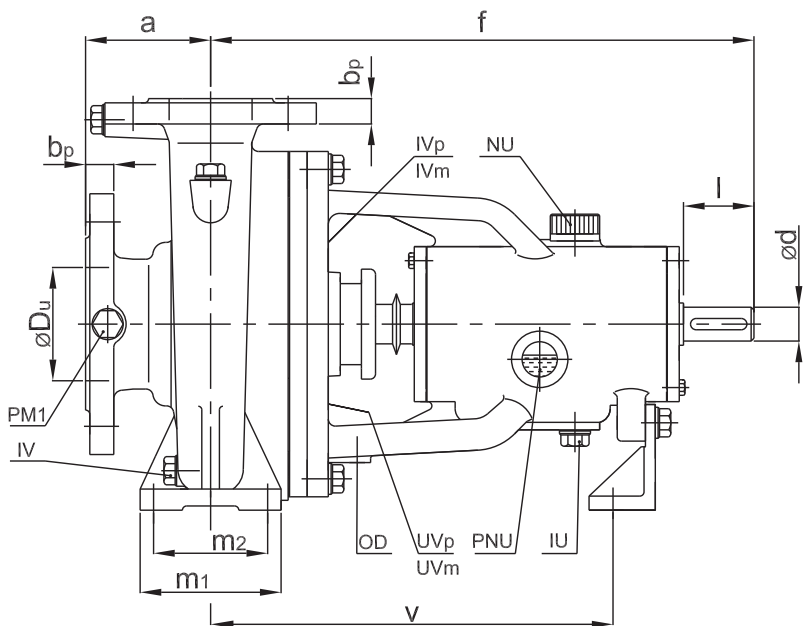
Pozicija	Naziv dela	Vrsta materijalnog izvođenja			
		ČL4574	SL250	ČL0401	PCuSn10
111	Spiralno kućište	ČL4574	SL250	ČL0401	PCuSn10
116	Poklopac kućišta	ČL4574	SL250	ČL0401	PCuSn10
117	Pritezač pletenice	ČL4574	SL250	SL250	PCuSn10
121	Procepni prsten	ČL4574	SL250	SL250	PCuSn10
211	Radno kolo	ČL4574	SL250	ČL0401	PCuSn10
212	Vratilo	Č.4574	Č.4172	Č.4172	Č.4570
214	Zaštitna čaura	Č.4574	Č.4172	Č.4172	PCuSn10
311	Nosač ležaja	SL250			

## MATERIALS

The table below provides the materials of construction of major parts of the pump.

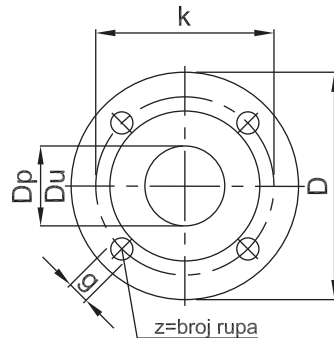
Item	Denomination	Materials			
		ČL4574	SL250	ČL0401	PCuSn10
111	Volute casing	ČL4574	SL250	ČL0401	PCuSn10
116	Casing cover	ČL4574	SL250	ČL0401	PCuSn10
117	Stuffing box	ČL4574	SL250	SL250	PCuSn10
121	Split ring	ČL4574	SL250	SL250	PCuSn10
211	Impeller blade	ČL4574	SL250	ČL0401	PCuSn10
212	Shaft	Č.4574	Č.4172	Č.4172	Č.4570
214	Protection sleeve	Č.4574	Č.4172	Č.4172	PCuSn10
311	Bearing pedestal	SL250			

ZAMENLJIVOST DELOVA / INTERCHANGABILITY OF PARTS	Delovi Pumpe / Part of pump														
	TIP PUMPE Type of pump	Spiralno kućište Volute casing 111	Poklopac kućišta Casing cover 113	Zaptivni prsten Wear ring 121	Radno kolo Impeller 211	Noga Foot 315	Nosač ležaja Bearing bracket 311	Poklopac ležaja Bearing cover 312	Vratilo Shaft 212	Ležaj Bearing 213	Zaštitna čaura Protection sleeve 214	Navrtka Nut 215	Centrifugalni odvijatelj Centrifugal separator 219	Pritezač pletenice Gland 117	H-prsten H-ring 118
	32-125	1	1	1	1	0	0	0	6305	1	1	1	35	35	8x8
	40-125	2	2	2	2	0	0	0	6305	1	1	1	35	35	8x8
	50-125	3	3	3	3	1A	0	0	6305	1	1	1	35	35	8x8
	65-125	4	4	4	4	2	0	0	6305	1	1	1	35	35	8x8
	32-160	5	5	5	5	1	0	0	6305	1	1	1	35	35	8x8
	32-200	6	6	6	6	2	0	0	6305	1	1	1	35	35	8x8
	40-160	7	7	7	7	1	1	1	6306	1	1	1	35	35	8x8
	40-200	8	8	8	8	1	1	1	6306	1	1	1	35	35	8x8
	50-160	9	9	9	9	2	1	1	6306	1	1	1	35	35	8x8
	50-200	10	10	10	10	2	1	1	6306	1	1	1	35	35	8x8
	32-250	11	11	11	11	3	1	1	6306	2	2	2	38	38	8x8
	40-250	12	12	12	12	3	1	1	6306	2	2	2	38	38	8x8
	40-315	13	13	13	13	4	1	1	6306	2	2	2	38	38	8x8
	50-250	14	14	14	14	3	2	2	6307	2	2	2	38	38	8x8
	65-160	15	15	15	15	2A	2	2	6307	2	2	2	38	38	8x8
	65-200	16	16	16	16	3	2	2	6307	2	2	2	38	38	8x8
	80-160	17	17	17	17	3	2	2	6307	2	2	2	38	38	8x8
	50-315	18	18	18	18	5	3	3	6308	3	3	3	45	45	10x10
	65-250	19	19	19	19	4	3	3	6308	3	3	3	45	45	10x10
	80-200	20	20	20	20	2	3	3	6308	3	3	3	45	45	10x10
	80-250	21	21	21	21	5	3	3	6308	3	3	3	45	45	10x10
	100-200	22	22	22	22	4	4	4	6309	3	3	3	45	45	10x10
	65-315	23	23	23	23	5	4	4	6309	3	3	3	45	45	10x10
	80-315	24	24	24	24	6	4	4	3309	3	3	3	45	45	10x10
	80-400	25	25	25	25	7A	4	4	NU	3	3	3	45	45	10x10
	100-250	26	26	26	26	5	4	4	309	3	3	3	45	45	10x10
	100-315	27	27	27	27	5	4	4	309	3	3	3	45	45	10x10
	125-250	28	28	28	28	6	5	5	3311	4	4	4	60	60	10x10
	100-400	29	29	29	29	6	5	5	311	4	4	4	60	60	10x10
	125-315	30	30	30	30	6	5	5	311	4	4	4	60	60	10x10
	125-400	31	31	31	31	7	5	5	311	4	4	4	60	60	10x10
	150-250	32	32	32	32	6	6	6	3313	4	4	4	60	60	10x10
	150-315	33	33	33	33	7	6	6	313	4	4	4	60	60	10x10
	150-400	34	34	34	34	7	6	6	313	4	4	4	60	60	10x10
	150-500	35	35	35	35	8	6	6	313	4	4	4	60	60	10x10
	200-250	36	36	36	36	8A	6	6	313	4	4	4	60	60	10x10
	200-315	37	37	37	37	8A	6	6	313	4	4	4	60	60	10x10
	200-400	38	38	38	38	8A	6	6	313	4	4	4	60	60	10x10
	250-315	39	39	39	39	9A	6	6	313	4	4	4	60	60	10x10
	200-500	40	40	40	40	9	7	7	3315	5	5	5	80	80	12x12
	250-400	41	41	41	41	9	7	7	315	5	5	5	80	80	12x12
	250-500	42	42	42	42	10	7	7	315	5	5	5	80	80	12x12

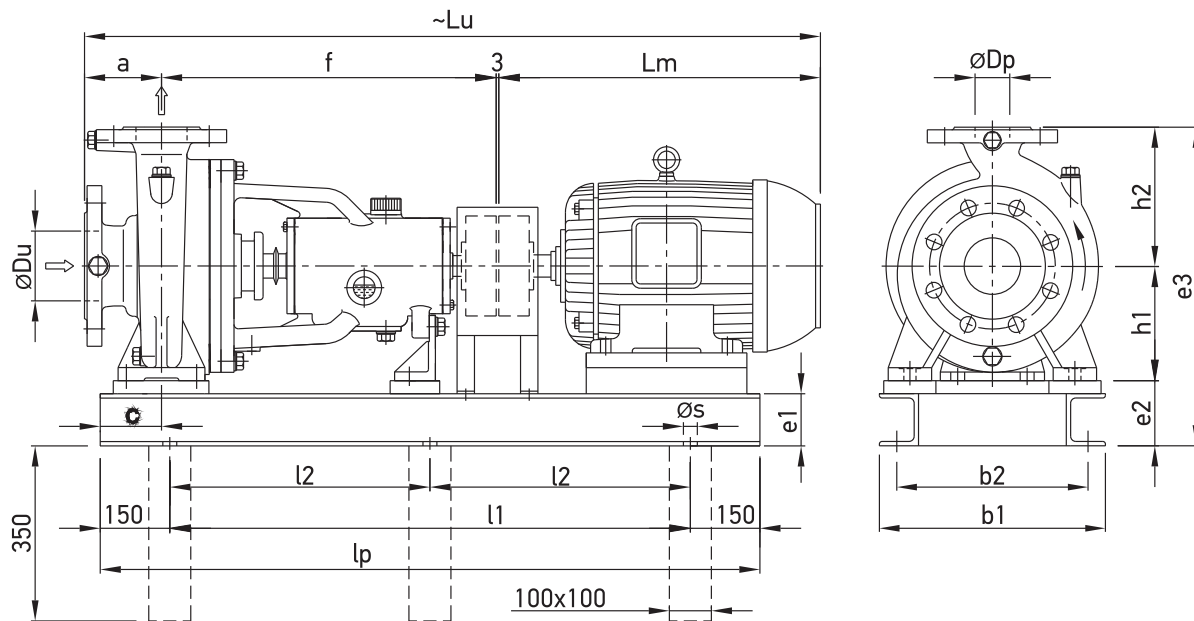


Tip pumpe Type of pump	Dimenzije / Dimensions (mm)															Masa Mass (kg)				
	Du	Dp	a	f	h <sub>1</sub>	h <sub>2</sub>	b	m <sub>1</sub>	m <sub>2</sub>	n <sub>1</sub>	n <sub>2</sub>	n <sub>3</sub>	v	s	s <sub>1</sub>		d	l		
32-125	50	32	80	385	112	140	50	100	70	190	140	285	14	24	50	45				
32-160					132	160											240	190	48	
32-200					160	180											320	250	52	
32-250	65	40	100	500	180	225	65	125	95	320	250	370	14	32	80	80				
40-125					112	140											210	160	45	
40-160					132	160											240	190	50	
40-200	65	40	100	160	180	180	50	100	70	240	190	285	14	24	50	55				
40-250					180	225											320	250	82	
40-315					200	250											345	280	105	
50-125	80	50	100	385	132	160	50	100	70	240	190	285	14	32	80	48				
50-160					160	180											265	212	53	
50-200					180	225											320	250	55	
50-250	80	50	125	500	200	250	65	125	95	345	280	370	14	32	80	105				
50-315					225	280											345	280	110	
65-125					385	180											65	125	95	280
65-160	100	65	100	160	180	200	80	160	120	400	315	110	18	32	80	83				
65-200					200	250											360	280	90	
65-250					225	280											400	315	100	
65-315	100	65	530	225	280	280	80	160	120	400	315	370	18	42	110	145				
80-160					180	225											320	250	95	
80-200					225	280											345	280	103	
80-250	125	80	125	500	250	315	65	125	95	345	280	370	18	32	80	103				
80-315					225	280											400	315	117	
80-400					250	315											435	355	148	
100-200	125	80	500	200	280	280	80	160	120	360	280	370	18	32	80	114				
100-250					225	280											400	315	132	
100-315					250	315											400	315	153	
100-400	125	80	530	280	280	280	100	200	150	500	400	370	18	32	80	114				
125-250					250	355											400	315	223	
125-315					280	355											400	315	150	
125-400	150	125	125	280	315	400	80	160	120	400	315	370	18	42	110	150				
150-250					280	375											500	400	170	
150-315					315	400											500	400	170	
150-400	200	150	160	315	400	400	100	200	150	550	450	140	500	23	48	110	187			
150-500					315	455												550	450	302
200-250					375	500												550	450	342
200-315	200	200	180	670	425	425	550	450	140	500	500	23	18	32	80	114				
200-400					425	450											550	450	310	
200-500					355	450											660	560	345	
250-315	250	200	200	700	425	560	660	560	200	560	560	27	18	60	140	460				
250-400					425	600											690	500	460	
250-500					475	670											800	670	390	
300-250	300	250	200	700	425	600	130	260	190	800	670	200	560	27	60	140	565			
300-315					425	600												800	670	685
300-400					475	670												800	670	685

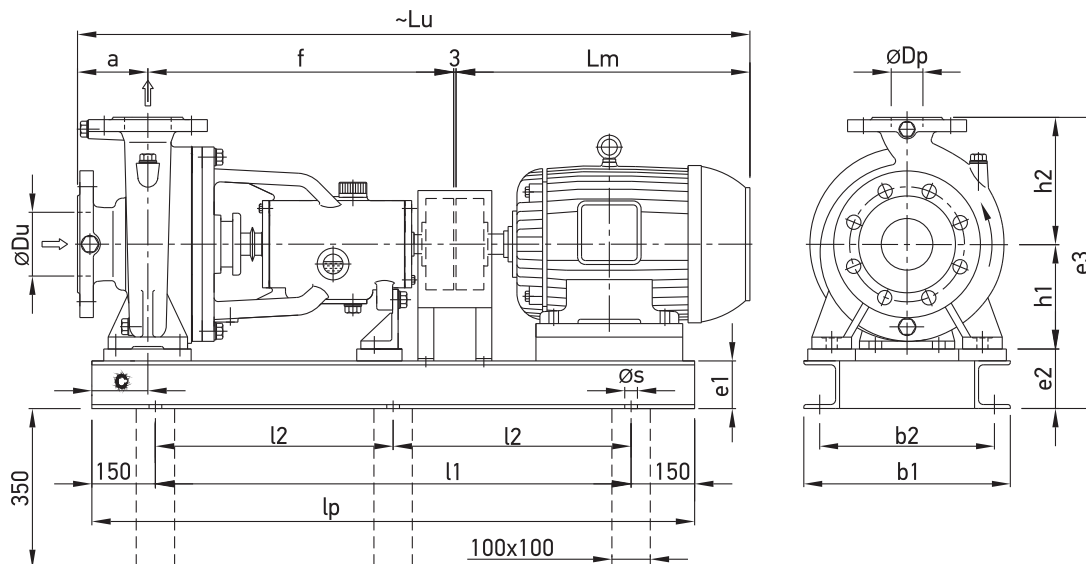
PRIKLJUČCI CONNECTIONS		Velicina Size 32-125 80-200	Velicina Size 80-315 250-500
UVp	Ulaz rashladne vode za pletenicu Input cooling water for a soft packing	R 1/4"	R 1/2"
UVm	Ulaz rashladne vode za meh. zaptivku Input cooling water for mechanical seal		
IVp	Izlaz rashladne vode za pletenicu Output cooling water for mechanical seal		
IVm	Izlaz rashladne vode za meh. zaptivku Input cooling water for mechanical seal		
NV	Otvor za nalivanje vode u pumpu Opening for draining water		
IV	Otvor za ispuštavanje vode iz pumpe Opening for draining water		
PM	Priključak za merenje pritiska na usisu Connector for measuring pressure on suction		
PM2	Priključak za merenje pritiska na potisu Connector for measuring pressure on delivery		
IU	Otvor za ispuštavanje ulja Oil level indicator		
PNU	Pokazivač nivoa ulja Oil level indicator		
OD	Otvor za drenažu Drain opening		
NU	Otvor za nalivanje ulja i ozračivanje Opening for filling oil and irradiation		



PRIKLJUČNE MERE PRIRUBNICA FLANGE CONNECTION						
Du	Dp	D	bp	k	g	Broj rupa No of holes z
32	140	18	100	18	4	
40	150	18	110	18	4	
50	165	20	125	18	4	
65	185	20	145	18	4	
80	200	22	160	18	8	
100	220	24	180	18	8	
125	250	26	210	18	8	
150	285	26	240	23	8	
200	340	26	295	23	8	
250	405	26	355	27	12	
300	460	28	410	27	12	



Tip pumpe Type of pump	Elektromotor Electric motor		Dimenzije / Dimensions (mm)																		Elastična spojnica elastic coupling	Masa Mass (kg)	
	Tip Type	KW	min <sup>-1</sup>	ØDu	ØDp	a	f	h1	h2	Lm	l1	l2	lp	b1	b2	e1	e2	e3	c	Øs			Lu
32-125	80 A	0.55	1450	50	32	80	385	112	140	274	385	---	685	180	145	65	78	330	70	14	742	3	68
	80 B	0.75								307	400		700								775		75
	80 B	1.1	2900							332	425	725	800								80		
	90 S	1.5								370	450	750	838								90		
32-160	80 A	0.55	1450	50	32	80	385	132	160	274	385	---	685	230	195	65	78	370	70	14	742	3	71
	80 B	0.75								332	425		725								800		83
	90 L	2.2	2900							370	450	750	838								90		
	100 L	3								380	460	760	848								97		
32-200	80 B	0.75	1450	50	32	80	385	160	180	274	385	---	685	240	200	65	80	420	70	14	742	3	75
	90 S	1.1								307	400		700								775		80
	90 L	2.2	2900							332	425	725	800								88		
	100 L	3								370	450	750	838								95		
	112 M	4	2900							380	460	760	848								102		
	132 Sk	5.5								441	510	810	909								125		
132 S	7.5	909	4	134																			
32-250	90 S	1.1	1450	50	32	100	500	180	225	307	520	---	820	300	260	80	95	500	80	14	910	3	117
	90 L	1.5								332	545		845								935		121
	100 L	2.2	2900							370	590	890	973								128		
	132 S	7.5								441	645	945	1044								163		
	160 Mk	11	2900							589	765	1065	1192								192		
	160 M	15								1192	215												
40-125	80 A	0.55	1450	65	40	80	385	112	140	274	385	---	685	210	175	65	78	330	70	14	742	3	69
	80 B	0.75								332	425		725								800		82
	90 L	2.2	2900							370	450	750	838								85		
	100 L	3								370	450	750	838								85		
40-160	80 A	0.55	1450	65	40	80	385	132	160	274	385	---	685	240	200	65	78	370	70	14	742	3	75
	80 B	0.75								307	400		700								775		80
	90 S	1.1	2900							332	420	720	800								87		
	90 L	2.2								370	450	750	838								90		
	100 L	3	2900							380	460	760	848								97		
	112 M	4								441	500	800	909								123		
132 Sk	5.5	909	4	123																			
40-200	90 S	1.1	1450	65	40	100	385	160	180	307	400	---	700	265	230	65	78	418	70	14	795	3	87
	90 L	1.5								332	425		725								810		90
	132 Sk	5.5	2900							441	500	800	929								145		
	132 S	7.5								589	620	920	1077								174		
	160 Mk	11	1077							3	174												

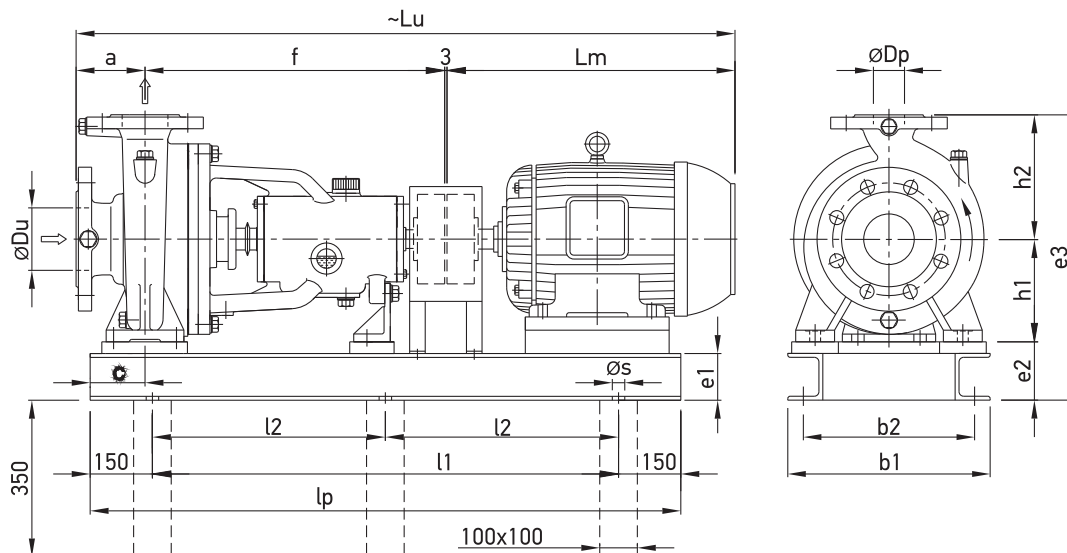


Tip pumpe Type of pump	Elektromotor Electric motor		Dimenzije / Dimensions (mm)																		Elastična spojnica elastic coupling	Masa Mass (kg)	
	Tip Type	KW	min <sup>-1</sup>	ØDu	ØDp	a	f	h1	h2	Lm	l1	l2	lp	b1	b2	e1	e2	e3	c	Øs			Lu
40-250	90 L	1.5	1450	65	40	100	500	180	225	332	550	---	850	300	260	80	98	503	80	14	935	3	132
	100 L	2.2								370	590		890								973		138
	100 Ld	3								589	765		1065								1192		145
	160 Mk	11	2900							633	810	1110	1236								240		
	160 M	15								370	590	890	998								167		
	160 L	18.5								441	645	945	1069								195		
40-315	132 M	7.5	1450	65	40	125	500	200	250	479	680	---	980	330	290	80	98	548	80	14	1107	4	207
	180 M	22								652	800		1100								1270		290
	200 Lk	30								2900	758		900								1200		370
	200 L	37	370								590	890	998	167									
	132 S	5.5	441								645	945	1069	195									
	50-125	80 A	0.55							1450	80	50	100	385	132						160	274	385
80 B		0.75	307	400	700	795	79																
90 S		1.1	380	460	760	868	95																
112 M		4	2900	441	500	800	929	120															
132 Sk		5.5		1450	274	385	685	762	80														
132 S		7.5			307	390	690	795	86														
50-160	80 A	0.55	1450		80	50	100	385	160	180	274	385	---	685	255	220	65	78	418	70	14	762	3
	80 B	0.75		307							390	690		795								86	
	90 S	1.1		370							450	750		858								100	
	100 L	3	2900	380							460	760	868	102									
	112 M	4		441							500	800	929	125									
	132 Sk	5.5		589							620	920	1077	175									
	132 S	7.5	1450	307	390	690	795	80															
160 Mk	11	2900		332	420	720	820	85															
160 M	15			370	450	750	858	90															
50-200	112 M		4	1450	80	50	100	385	160	200	380	460	---	760	255	220	65	78	438	70	14	868	4
	132 Sk	5.5	441								500	800		929								128	
	132 S	7.5	589								620	920		1077								182	
	160 Mk	11	2900	307							390	690	795	80									
	160 M	15		332							420	720	820	85									
	90 S	1.1		370							450	750	858	90									
	50-250	100 L	2.2	1450	80	50	125	500	180	225	332	560	---	860	300	260	65	78	483	80	14	960	4
100 Ld		3	370								590	890		998								130	
112 M		4	380								460	760		868								107	
160 M		15	2900	441							500	800	929	139									
160 L		18.5		589							750	1050	1217	225									
180 M		22		633							775	1075	1261	240									
200 Lk		30	1450	652	795	1095	1280	260															
90 L		1.5		758	880	1180	1386	320															

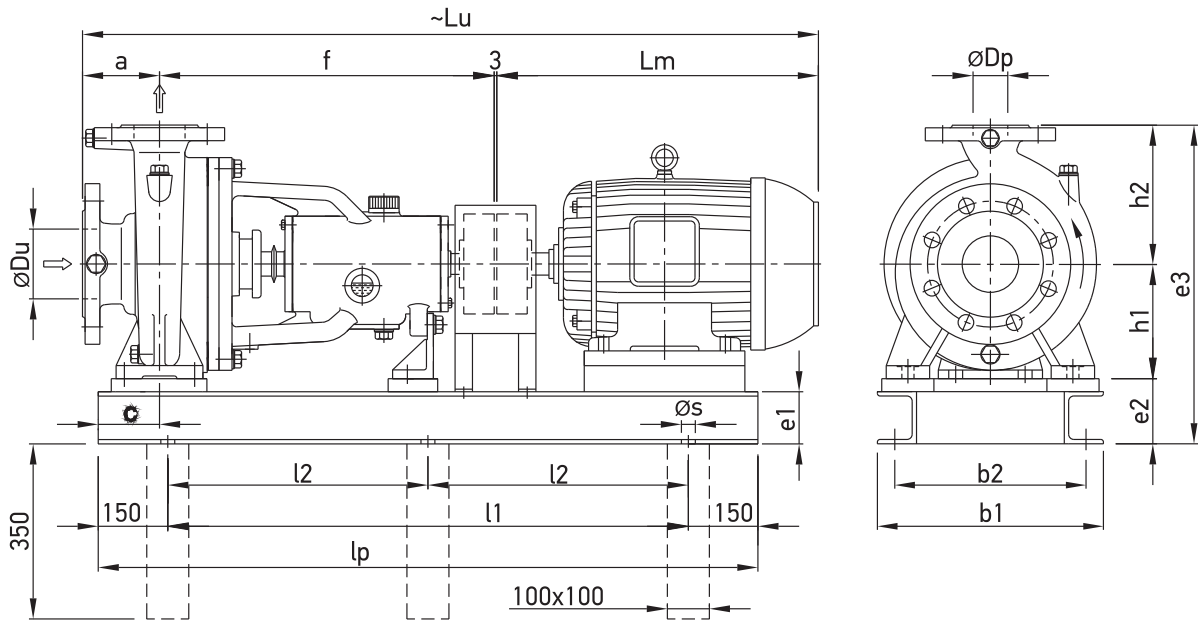


MERNA SKICA AGREGATA PUMPE

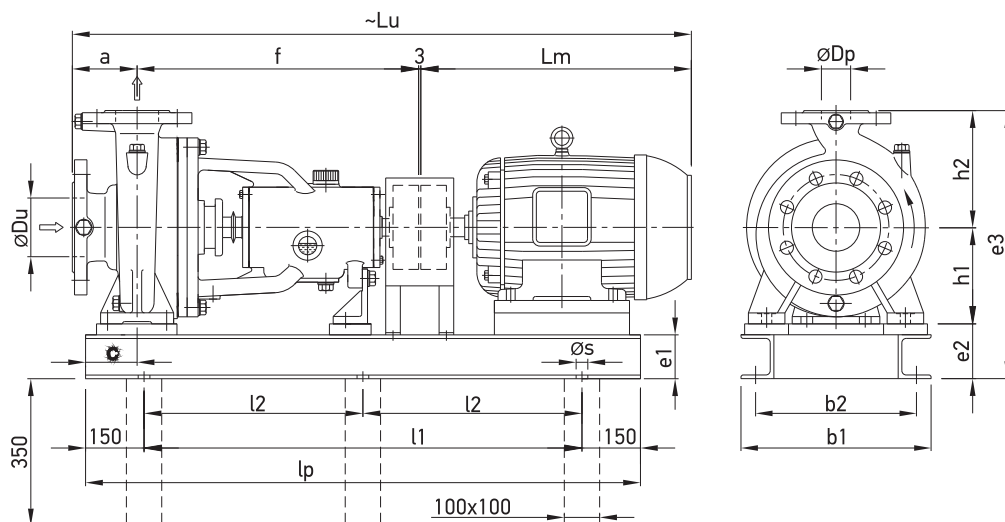
DRAWING MEASURE OF PUMP SET



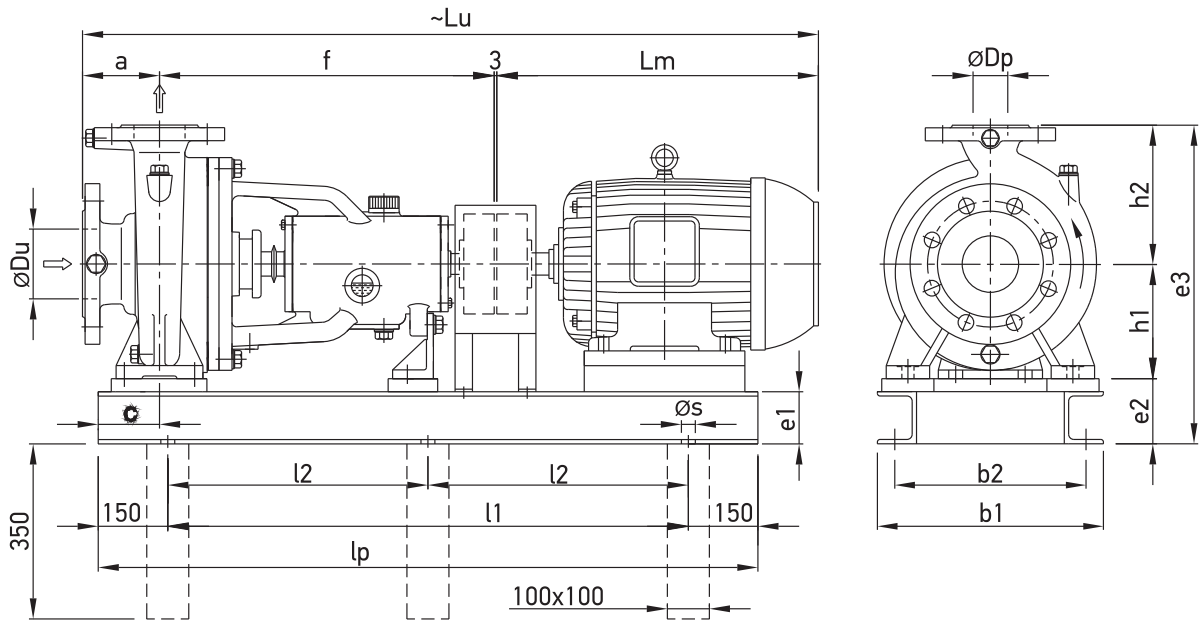
Tip pumpe Type of pump	Elektromotor Electric motor			Dimenzije / Dimensions (mm)																	Elastična spojnica elastic coupling	Masa Mass (kg)										
	Tip Type	KW	min <sup>-1</sup>	ØDu	ØDp	a	f	h1	h2	Lm	l1	l2	lp	b1	b2	e1	e2	e3	c	Øs			Lu									
50-315	132 S	5.5	1450	80	50	125	500	225	280	441	625	---	925	335	290	100	118	623	80	14	1069	4	200									
	132 M	7.5								479	680		980								1107		210									
	160 M	11								589	760		1060								1217		240									
	200 Lk	30	2900							80	50	125	500	225	280	758	900	---	1200	370	320	120	144	649	80	14	1386	5	380			
	200 L	37														800	930		1230	420	370						1428		480			
	225 M	45														906	995		1295	455	405						1534		590			
	250 M	55														906	995		1295	455	405						1534		590			
65-125	80 B	0.75	1450	100	65	100	385	160	180	274	380	---	680	260	220	80	98	438	80	14	762	3	95									
	90 S	1.1								307	400		700								795		110									
	132 Sk	5.5	2900							100	65	100	385	160	180	441	510	---	810	260	220	80	98	438	80	14	929	3	135			
	132 S	7.5														589	630		930								300		260	1077	185	
	160 Mk	11														589	630		930								300		260	1077	185	
65-160	80 B	0.75	1450	100	65	100	500	160	200	274	500	---	800	260	220	80	98	458	80	14	877	4	130									
	90 S	1.1								307	520		820								910		145									
	90 L	1.5								332	560		860								935		150									
	100 L	2.2	2900							100	65	100	500	160	200	370	590	---	890	260	220	80	98	458	80	14	973	4	155			
	112 M	4														380	590		890								983		165			
	132 Sk	5.5														441	635		935								1044		180			
	132 S	7.5														441	635		935								1044		190			
	160 Mk	11														589	755		1055								310		270	1192	210	
	160 M	15														589	755		1055								310		270	1192	225	
65-200	100 L	2.2	1450	100	65	100	500	180	225	370	590	---	890	300	260	80	98	503	80	14	973	4	165									
	100 Ld	3								380	590		890								983		172									
	112 M	4								380	590		890								983		172									
	160 M	15	2900							100	65	100	500	180	225	589	755	---	1055	325	285	100	118	523	80	14	1192	5	240			
	160 L	18.5														633	800		1100								1236		245			
	180 M	22														652	800		1100								1255		270			
	200 Lk	30														758	880		1180								380		330	1441	338	
65-250	112 M	4	1450	100	65	125	500	200	250	380	610	---	910	325	285	80	98	548	100	14	1008	4	170									
	132 S	5.5								441	655		955								1069		195									
	132 M	7.5								479	695		995								1107		210									
	180 M	22	2900							100	65	125	500	200	250	652	790	---	1090	370	325	100	118	568	100	14	1280	5	295			
	200 Lk	30														758	900		1200								370		325	1386	375	
	200 L	37														800	950		1250								410		365	1428	450	
	225 M	45														800	950		1250								410		365	1428	450	
65-315	132 S	5.5	1450	100	65	125	530	225	280	441	680	---	980	360	320	80	98	603	100	18	1099	4	245									
	132 M	7.5								479	720		1020								1137		255									
	160 M	11								589	810		1110								1247		290									
	160 L	15	2900							100	65	125	530	225	280	633	830	---	1130	410	365	100	118	623	100	18	1291	6	310			
	225 M	45														800	950		1250								410		365	1458	500	
	280 S	75														973	---		545								1390		515	465	1631	740
	280 M	90														1024	---		570								1440		515	465	1682	830



Tip pumpe Type of pump	Elektromotor Electric motor			Dimenzije / Dimensions (mm)																	Elastična spojnica elastic coupling	Masa Mass (kg)	
	Tip Type	KW	min <sup>-1</sup>	ØDu	ØDp	a	f	h1	h2	Lm	l1	l2	lp	b1	b2	e1	e2	e3	c	Øs			Lu
80-160	90 L	1.5	1450	125	80	125	500	180	225	332	560	---	860	300	260	80	98	503	80	14	960	4	182
	100 L	2.2								370	590		890								998		186
	100 Ld	3								380	---		1008								190		
	112 M	4								589	755		1055								195		
	160 Sk	15	2900							633	800	1100	1217	275									
	160 L	18.5								652	800	1100	1261	285									
	180 M	22								758	885	1185	1280	305									
	200 Lk	30								758	885	1185	1386	365									
80-200	100 Ld	3	1450	125	80	125	500	180	250	370	590	---	890	325	285	80	98	528	80	14	998	4	172
	112 M	4								380	630		930								1008		175
	132 S	5.5								441	630		930								1069		200
	160 M	15								589	755		1055								1217		260
	160 L	18.5	2900							633	800	1100	1261	275									
	180 M	22								652	800	1100	1280	298									
	200 Lk	30								758	880	1180	1386	355									
	200 L	37								758	880	1180	1386	375									
80-250	132 S	5.5	1450	125	80	125	500	225	280	441	660	---	960	370	225	100	98	603	100	14	1069	4	230
	132 M	7.5								479	700		1000								1107		240
	160 M	11								589	780		1080								1217		280
	200 Lk	30	2900							758	900	1200	1386	360									
	200 L	37								800	---	465	1230	410	365	100	118	623	1428	460			
	225 M	45								906	---	510	1320	460	415	1534	580						
	250 M	55								906	---	510	1320	460	415	1534	580						
80-315	132 M	7.5	1450	125	80	125	530	250	315	749	730	---	1030	370	325	100	123	688	100	14	1137	5	260
	160 M	11								589	805		1105								1247		290
	160 L	15								633	850		1150								1291		340
	180 M	18.5								652	850		1150								1310		370
	280 S	75	2900							973	---	545	1390	525	465	160	183	785	1631	770			
	280 M	90								1024	---	570	1440	1682	890								
	315 S	110								1072	---	580	1460	1730	980								
	315 M	132								1123	---	605	1510	1781	1150								
80-400	160 L	15	1450	125	80	125	530	280	355	633	850	---	1150	410	360	120	144	779	100	14	1291	5	400
	180 M	18.5								652	885		1185								1310		430
	180 L	22								690	885		1185								1348		450
	200 L	30								758	920		1220								1416		510
100-200	112 M	4	1450	125	100	125	500	200	280	380	610	---	910	330	285	100	118	598	100	14	1008	4	205
	132 S	5.5								441	645		945								1069		220
	132 M	7.5								479	645		945								1107		230
	160 M	11								589	785		1085								1217		260



Tip pumpe Type of pump	Elektromotor Electric motor		Dimenzije / Dimensions (mm)																	Elastična spojnica elastic coupling	Masa Mass (kg)																	
	Tip Type	KW	min <sup>-1</sup>	ØDu	ØDp	a	f	h1	h2	Lm	l1	l2	lp	b1	b2	e1	e2	e3	c			Øs	Lu															
100-200	180 M	22	2900	125	100	125	500	200	280	652	820	---	1120	330	285	120	145	625	100	14	1280	5	385															
	200 Lk	30								758	---	460	1220	370	320						1386		400															
	200 L	37								800	---	510	1320	475	425						1428	6	420															
	250 M	55								973	---	530	1360	515	465						1601		620															
	280 S	75								---	---	---	---	---	---						---		1601	730														
100-250	132 M	7.5	1450	125	100	140	530	225	280	479	730	---	1030	140	118	623	100	14	1152	5	250																	
	160 M	11								589	810	---	1110						370		325	1262	280															
	160 L	15								633	850	---	1150						---		---	1306	300															
	250 M	55	2900							140	530	225	280						280	280	800	---	520	1340	470	410	140	163	668	100	14	1473	6	650				
	280 L	75																			973	---	545	1390	525	465						1646		750				
	280 M	90																			1024	---	570	1440	580	520						1697		840				
	315 S	110																			1072	---	585	1470	580	520						1745		920				
100-315	160 L	15	1450	125	80	140	530	250	315					633	830	---	1130	370			320	120	145	710	100	18	1306	5	325									
	180 M	18.5												652	850	---	1150										---		---	1325	345							
	180 L	22												690	890	---	1190										---		---	1363	360							
	200 L	30	2900							140	530	250	315	315	315	758	940		---	1240							525	465	160	185	750	100	18	1431	6	420		
	280 M	90														1024	---		570	1440														525		465	1697	840
	315 S	110														1072	---		585	1470														580		520	1745	920
	315 M	132														1123	---		610	1520														580		520	1796	1180
	315 M*	200	1238													---	615		1530	---							---	1911	1340									
100-400	180 M	18.5	1450	125	100	140	530	280	355							652	870	---	1170	460	410	120	144	779	120	18	1325	5	420									
	180 L	22														690	910	---	1210								---		---	1363	435							
	200 L	30														758	960	---	1260								---		---	1431	510							
	225 S	37								805	980	---	1280	---	---	1478	560																					
125-250	160 M	11	1450							150	125	140	530	250	355	589	800	---	1100	365	320	100	118	723	100	18	1262	5	300									
	160 L	15														633	850	---	1150								---		---	1306	325							
	180 M	18.5														652	890	---	1190								---		---	1325	345							
	180 L	22	2900													140	530	250	355								355	355	690	890	---	1190	890	750	120	130	735	100
	280 M	90		975	---	---	2000	---	---																				1431	480								
	315 S	110		1200	---	---	2000	---	---																				1980	1430								
	315 M	132		1310	---	---	2000	---	---																				1980	1545								
	315 La	160	1310	---	---	2000	---	---	1980																				1590									
125-315	180 M	18.5	1450	150	125	140	530	280	355	652	870	---	1170	400	450					100	123	758	120	18	1325	5			380									
	180 L	22								690	910	---	1210												---				---	1365	395							
	200 L	30								758	960	---	1260												---				---	1431	480							
	315 M	132	2900							140	530	280	355	355	355	1310	1340	---	2000	890	750	120	130	765	120	28	1980	9	1545									
	315 La	160														1310	1340	---	2000								---		---	1980	1590							
315 Lb	200	1310	1340	---	2000	---	---	1980	1590																													
125-400	200 L	30	1450	150	125	140	530	315	400							758	---	480	1260	460	410	120	144	859	120	18	1431	6	540									
	225 S	37														805	---	490	1280								---		---	1478	590							
	250 M	55								906	---	535	1370	---	---	1579	730																					
	280 S	75								973	---	555	1410	520	470	1646	870																					
150-250	160 L	15	1450							200	150	160	530	280	375	633	870	---	1170	450	405	100	122	777	120	18	1326	5	345									
	180 L	22														690	910	---	1210								---		---	1383	380							
	200 L	30														758	960	---	1260								---		---	1451	460							



Tip pumpe Type of pump	Elektromotor Electric motor		Dimenzije / Dimensions (mm)																	Elastična spojnica elastic coupling	Masa Mass (kg)		
	Tip Type	KW	min <sup>-1</sup>	ØDu	ØDp	a	f	h1	h2	Lm	l1	l2	lp	b1	b2	e1	e2	e3	c			Øs	Lu
150-315	200 L	30	1450	200	150	160	670	315	400	758	---	550	1400	510	460	120	144	859	120	18	1591	6	625
	225 S	37								805		565	1430								1638		680
	225 M	45								830		575	1450								1663		720
	250 M	55								906		605	1510								1739		820
150-400	225 M	45	1450	200	150	160	670	315	455	830	---	575	1450	520	460	160	183	953	120	18	1663	6	755
	250 M	55								906		605	1510								1739		855
	280 S	75								973		625	1550								1806		990
	280 M	90								1024		650	1600								1857		1050
150-500	280 M	90	1450	200	150	180	670	375	500	1024	---	650	1600	520	460	160	183	1058	120	18	1877	7	1170
	315 S	110								1102		675	1650								1955		1320
	315 M	132								1153		700	1700								2006		1425
	315 Mk*	160								1268		725	1750								2121		1660
200-250	180 L	22	1450	200	200	180	670	355	425	690	---	525	1350	510	460	120	144	924	120	18	1543	6	550
	200 L	30								758		550	1400								1611		635
	225 S	37								805		565	1430								1658		690
200-315	225 S	37	1450	250	200	200	670	355	450	805	---	565	1430	510	460	120	144	924	120	18	1678	6	730
	250 M	55								906		605	1510								1779		870
	280 S	75								973		625	1550								1846		1015
	280 M	90								1024		650	1600								1897		1100
200-400	315 S	110	1450	250	200	200	670	355	500	1102	---	675	1650	570	510	160	183	1038	120	18	1975	7	1255
	315 M	132								1153		700	1700								2026		1360
	315 Mk*	160								1268		725	1750								2141		1520
	315 M*	200								1268		775	1850								2241		1850
	315 M*	200								1268		775	1850								2241		1850
200-500	355 Mk*	250	1450	250	200	200	770	425	560	1533	---	840	1980	680	610	200	228	1213	120	18	2506	9	2600
	355 M*	315								1533		840	1980								2780		2780
	250 M	55								906		620	1540								1829		1030
250-315	280 S	75	1450	300	250	250	670	400	560	973	---	640	1580	640	570	180	204	1164	150	18	1896	7	1180
	280 M	90								1024		665	1630								1947		1240
	280 M	90								1024		715	1730								1997		1315
250-400	315 S	110	1450	300	250	200	770	425	600	1102	---	735	1770	750	680	200	232	1257	150	18	2075	7	1470
	315 M	132								1153		760	1820								2126		1575
	315 Mk*	160								1268		785	1870								2241		1910
	315 M*	200								1268		785	1870								2241		1930
250-500	315 M*	200	1450	300	250	200	770	475	670	1268	---	785	1870	760	680	240	272	1417	150	18	2241	8	2160
	355 Mk*	250								1758		855	2010								2731		2710
	355 M*	315								1758		855	2010								2731		2900

Za karakteristike krive centrifugalnih pumpi sa različitim brzinama, pod uslovom da se ne ide u kavitaciju, postoji sledeći zakon:

Krive Q-H i Q-P na n. o/min postaju Q'-H' i Q'-P' na n. o/min:

$$Q' = \left(\frac{n'}{n}\right) \cdot Q \quad H' = \left(\frac{n'}{n}\right)^2 \cdot H \quad P' = \left(\frac{n'}{n}\right)^3 \cdot P$$

Q=Protok (m<sup>3</sup>/h)

H=Ukupna visina dizanja (meters)

η= Ukupna efikasnost pumpe

p= Gustina tečnosti (Kg/dm<sup>3</sup>)

P= Potrebna snaga (kW)

$$P = \frac{p \cdot Q \cdot H}{367 \cdot \eta} = (\text{kW})$$

#### ADAPTACIJA PUMPI U RAZLIČITIM USLOVIMA RADA

U slučaju da se karakteristika pumpe razlikuje u odnosu na zahtev pogona, jedna od mogućnosti adaptacije na novi zahtev može se postići izmenom karakteristika pumpe smanjenjem spoljašnjeg prečnika radnog kola.

Formula za izračunavanje novog prečnika D' je sledeća:

$$D' \approx D \cdot \sqrt{\frac{H'}{H}}$$

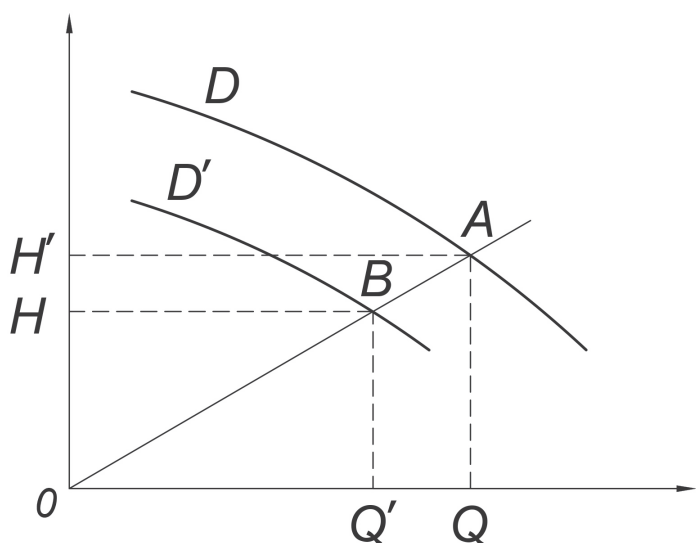
Prečnik redukcije može se dobiti na sledeći način:

U Q-H dijagram nacrtajte pravu liniju koja polazi od nulte (0) tačke koordinatnog sistema i seče novu funkcionalnu tačku (B) a ona seče krivu u tački (A) koja odgovara prečniku D radnog kola.

Na taj način, moguće je doći do H i H' vrednosti, koje kada se ubace u formulu, omogućavaju da se dobije približna vrednost prečnika D'. Ovaj proračun je važeći posebno za radialna radna kola.

U slučaju da tražene karakteristike treba dosta smanjiti, potrebno je da se prečnik ne smanjuje odjednom na izračunatu vrednost D', već je preporučljivo da se smanji na vrednost prečnika malo veću od tražene; testirati pumpu prvo i sa novom Q-H krivom odrediti konačni prečnik.

Ovaj postupak se više preporučuje kada je u pitanju veći broj obrtaja radnog kola.



Dijagram za određivanje prečnika redukcije  
Diagram to determine turning diameter

For the curves features of a centrifugal pump at various speeds, provided that it does not go into cavitation, there is an affinity law that is the following:

The curves Q-H and Q-P at n. r.p.m. becomes Q'-H' and Q'-P' at n. r.p.m.:

$$Q' = \left(\frac{n'}{n}\right) \cdot Q \quad H' = \left(\frac{n'}{n}\right)^2 \cdot H \quad P' = \left(\frac{n'}{n}\right)^3 \cdot P$$

Q=Capacity (m<sup>3</sup>/h)

H=Total manometric head (meters)

η= Total pump efficiency

p= Density of the fluid (Kg/dm<sup>3</sup>)

P= Absorbed power (kW)

$$P = \frac{p \cdot Q \cdot H}{367 \cdot \eta} = (\text{kW})$$

#### ADAPTATION OF THE PUMPS TO THE DIFFERENT CONDITIONS OF OPERATION

In case the characteristic of the pump is different from the one requested by the plant, one of the possibility of adaptation to this new condition can be achieved by modifying the characteristic of the pump by reducing the external diameter of the impeller.

The formula to calculate the new diameter D' is the following:

$$D' \approx D \cdot \sqrt{\frac{H'}{H}}$$

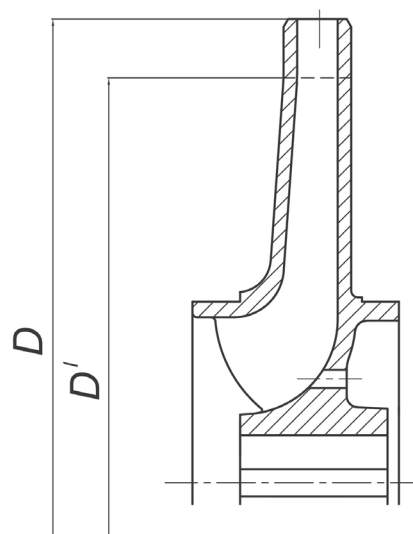
The turning diameter can be obtained in the following way:

In the diagram Q-H, draw a straight line which starts from origin (0) point of the cartesian axis and intersects the new functioning point (B) and that intersects in (A) the curve corresponding to the diameter D of the impeller.

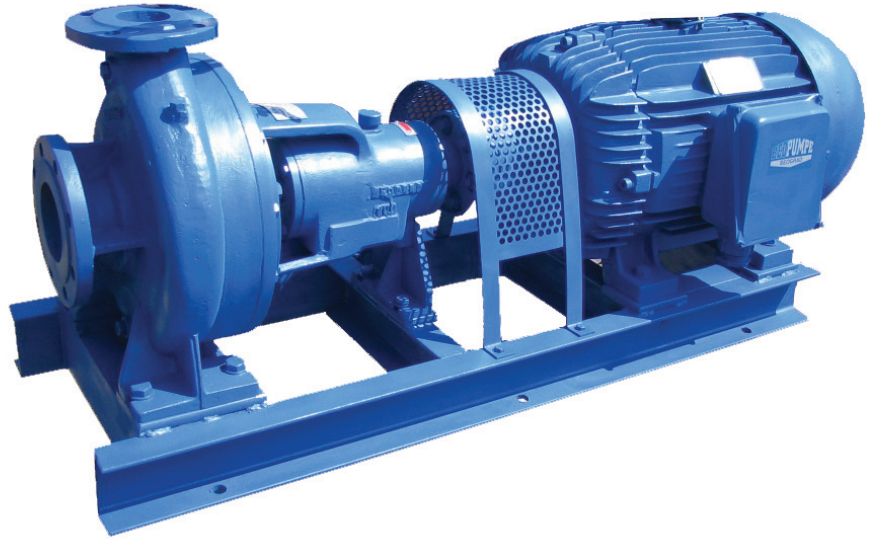
In this way, it is possible to obtain the H and H' values which, inserted into the formula, enable to obtain the approximate turning diameter D'. This calculation is valid especially for the radial impellers.

In case the requested characteristic needs to be highly reduced, it is necessary not to turn the diameter at once to the calculated value D' but it is advisable to turn it to a diameter value a little bit higher; test the pump first and with the new curve Q-H determinate the final diameter.

This procedure is the more advisable the more higher is the number of rounds of the impeller.



Smanjenje spoljnog prečnika radnog kola centrifugalne pumpe pomoću okretanja  
Reduction of the external diameter of the centrifugal pump impeller by means of turning





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