

Segmental Type Pumps

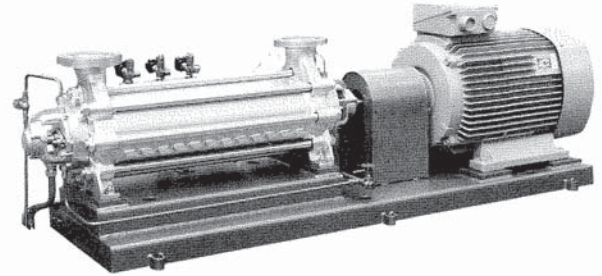
STERLING

HALBERG

HKG 4009 ··· 15011

TECHNICAL DATA

Capacity:	up to 490 m ³ /h	
Head:	up to 1400 m	
Speed (max):	approx. 6000 rpm ¹⁾	
Temperature:	up to 170 °C	
Casing pressure:	up to 160 bar	depending on the size and the material of construction
Shaft seal:	stuffing box or mechanical seal	
Mating dimensions for flange:	suction flange	DIN 2501 PN 16 / 25 ²⁾
	discharge flange	DIN 2501 PN 64 / 100 / 160
Direction of rotation:	clockwise, looking at the pump from the drive end	



APPLICATION

Series HKG centrifugal pumps are used in applications where the requirement is for trouble-free pumping of clear or slightly dirty liquids. They are used in:

- Small and medium-sized power stations for pumping boiler feedwater
- Pressurized water producing stations
- High-pressure cleaning plants
- High-pressure gas purifying plants
- Municipal and industrial waterworks and water supply plants
- Hydraulic oil installations
- Seawater desalting plants
- Reverse osmosis plants

DESIGN

Horizontal ring-section type centrifugal pumps with shrouded impellers.

The range covers 7 sizes, each having 3 to 16 stages maximum and various hydraulic internals. The impellers and diffusers, casing wear rings and shaft sleeves are replaceable. Depending on the material of construction, the diffusers of some pumps have been fitted additionally with a replaceable diaphragm bush.

Hydraulic axial thrust balancing is effected by balance discs. With pressure on the suction side, the balancing flow is returned to the pump suction casing, and in suction lift operation it is returned to the stuffing box on the suction side. A special model with return to the feedwater tank can be supplied. For special applications, the hydraulic thrust is balanced by a balance drum or balance disc, either with or without lift-off device, or by a balance drum with an additional thrust bearing to absorb the residual thrust.

The pump casing is clamped together with tie bolts and sealed by means of confined O-rings. The support feet are cast-on under the suction and discharge casings. A special model can also be supplied with the support feet arranged along the centreline of the pump. It is also possible to supply a bright sheet steel covering for the pump.

There are connection points for pressure gauges on the suction and discharge branches.

The driver is normally arranged on the suction side. A special model with the driver on the discharge side or on either side can be supplied on request.

All sizes can, if required, be supplied with one or more dummy stages, and with bleeder nozzles.

¹⁾ the maximum speed depends on the impeller material, the bearing configuration, the type of shaft seal, etc.

²⁾ available are DIN 2501 PN 40, DIN 2535 PN 40, and DIN 2545 PN 40.

³⁾ other material combinations upon request.

DESIGN DETAILS

Casing pressure:

Flange on the discharge side PN 64:
max. 64 bar from -10°C to 120°C
max. 55 bar at 170°C

Flange on the discharge side PN 160:

Size	Material 2 B ³⁾		
	Temperature °C		
	≤ 20	≤ 120	≤ 170
	max. casing pressure [bar]		
4000	160	154	149
5000	160	135	131
6500	160	160	160
8000	160	160	160
10000	160	160	160
12500	160	160	160
15000	160	160	160

Branch positions:

Suction and discharge branches arranged vertically upwards. Other branch positions available on request (special design).

Flange:

suction side: DIN 2533 PN 16 / DIN 2543 PN 16 / DIN 2534 PN 25²⁾ / DIN 2544 PN 25²⁾

discharge side: DIN 2546 PN 64 / DIN 2547 PN 100 / DIN 2548 PN 160

Upon request, flanges to ANSI B 16.1 or B 16.5 can be supplied.

Bearings:

Anti-friction bearing, grease-lubricated; anti-friction bearing, oil-lubricated; Sleeve bearing, oil-lubricated by means of an oil ring; Sleeve bearing, force feed oil-lubricated

Shaft sealing:

Cooled stuffing box with jacket cooling

Temperature range: -10 °C to 170 °C

Cooling connected at temperatures exceeding 105 °C.

Uncooled stuffing box

Temperature range: -10 °C to 105 °C.

Design with a mechanical seal:

The pump can be fitted with a single-acting mechanical seal with an elastomeric bellows, or according to DIN 24960.

As options, we can supply a balanced, single-action mechanical seal with seat and shaft seal chamber cooling, quenching connection and throttling bush.

Double-acting mechanical seals can be supplied upon request.

Materials of construction:

Part. no.	PUMP PART	MATERIALS OF CONSTRUCTION 1)					
		0 B	2 A	TA	2 B	4 B	4 U
10.6	Suction casing	0.6025	1.0619		1.4008	1.4408	1.4517
10.7	Discharge casing	1.0619		1.4008	1.4008	1.4408	1.4517
10.8	Stage casing	1.0401			1.4021	1.4401	1.4514
23.0	Impeller	Nicroguß			1.4008	1.4408	1.4517
17.1	Diffuser	0.6025			1.4008	1.4408	1.4517
50.2	Casing wear ring	0.6025			Nicroguß 2)	1.4401	1.4582
54.2	Diaphragm bush	-			Nicroguß 2)	-	-
21.1	Shaft	1.0503			1.4021 3)	1.4571	1.4462
52.3	Shaft sleeve	1.4122			1.4571	1.4571	1.4580
52.4	Shaft protection sleeve	1.4034				1.4571 4)	1.4580
52.41							
60.1	Balance disc					1.4571 4)	1.4582
60.2	Balance disc seal	1.4088			1.4408 5)		1.4517
46.1	Shaft seal	Soft packing					

1) Other materials available

2) Also available made from 1.4088

3) Also available made from 1.4313

4) Also available made from 1.4122

5) Also available made from 1.4088

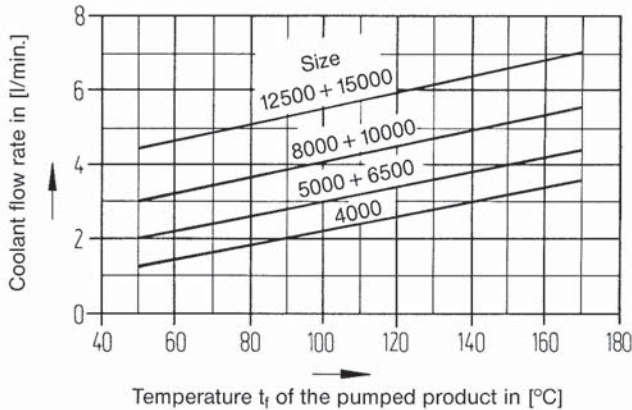
Casing gasket:

The casing is sealed off with O-rings.

Drive / speed:

Normally by means of a standard electric motor, 50 or 60 Hz, type B3. Turbine drive or drive via gears at higher speeds.

Coolant flow rates for cooled stuffing box



Coolant flow rates for cooling of ring-oiled bearings

Size	Coolant l/min
4000	2
5000, 6500	2.5
8000, 10000	4
12500, 15000	6

Inlet temperature of the coolant: 20–25 °C,
Allowable coolant pressure: 6 bar

General information

The following pumps are also included in our sales programme:

HLW Ring-section type centrifugal pump for capacities of up to 650 m³/h and a maximum discharge head of 64 bar.

HMG Ring-section type high-pressure centrifugal pump for capacities of up to 1400 m³/h and a maximum discharge head of 160 bar.

HRG Ring-section type high-pressure centrifugal pump for capacities of up to 80 m³/h and a maximum discharge head of 200 bar.

HSG Ring-section type super-pressure centrifugal pump for capacities of up to 800 m³/h and a maximum discharge head of 250 bar.

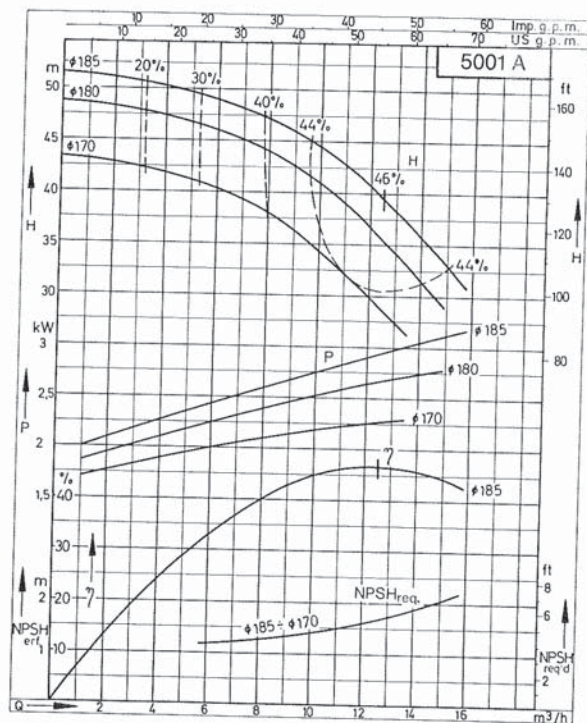
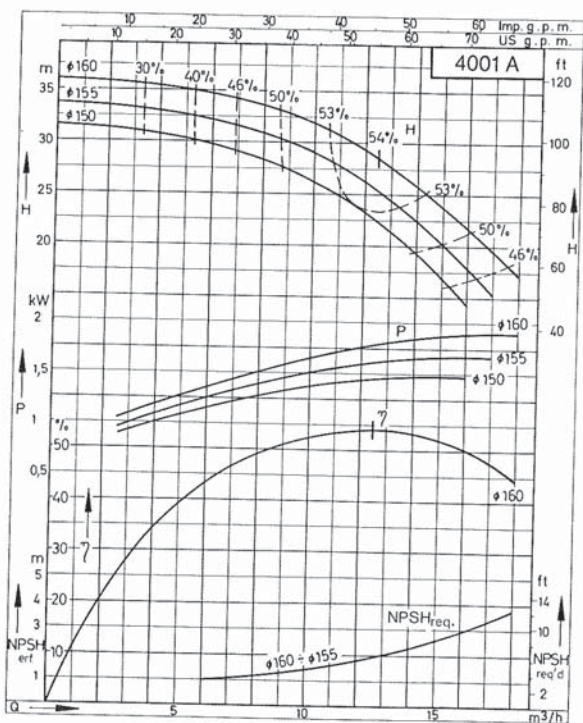
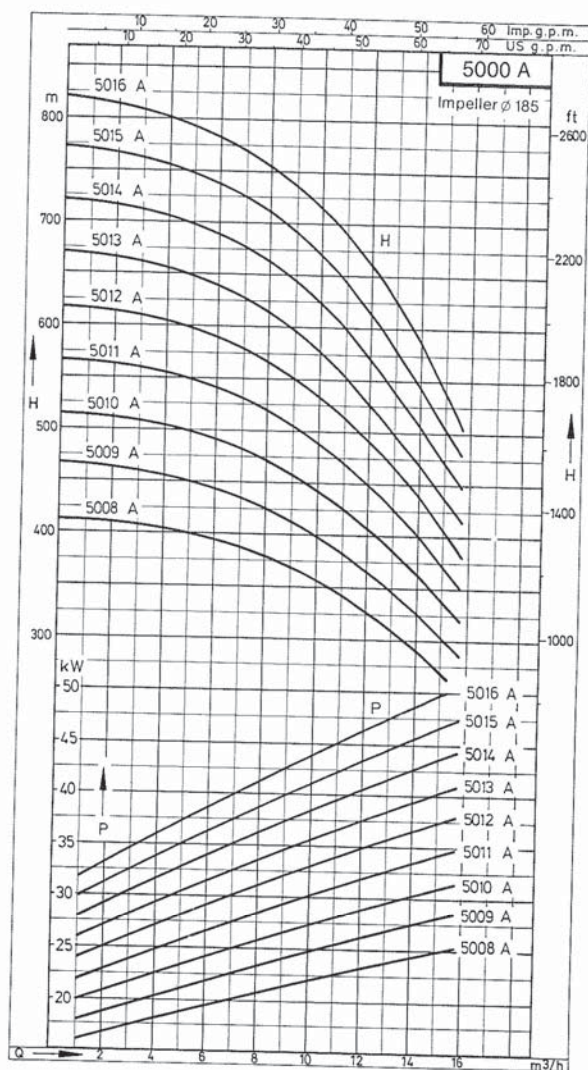
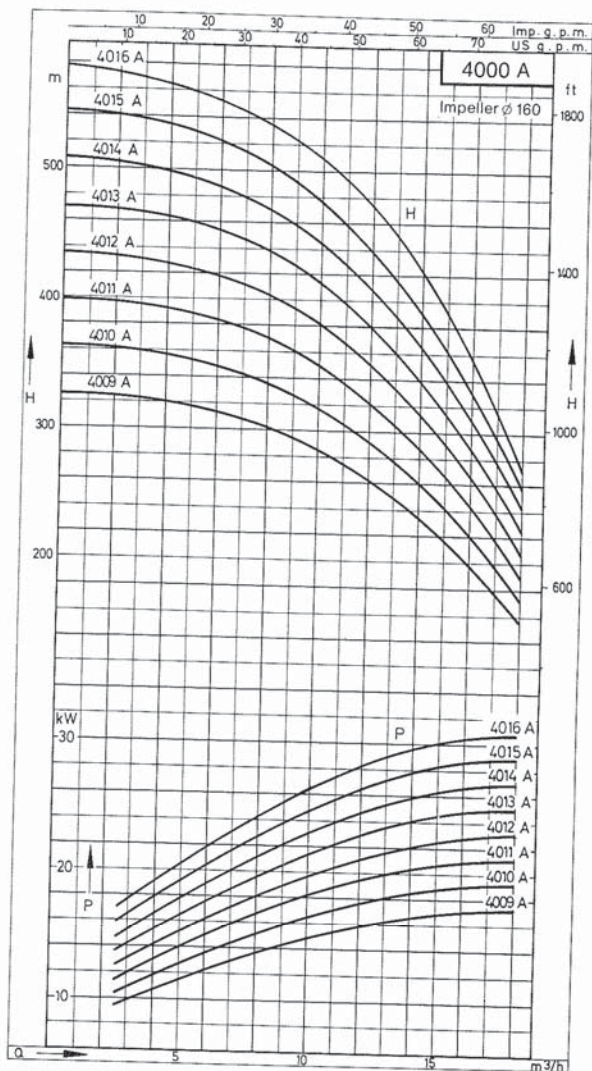
HDG Ring-section type super-pressure centrifugal pump for capacities of up to 550 m³/h and a maximum discharge head of 350 bar.

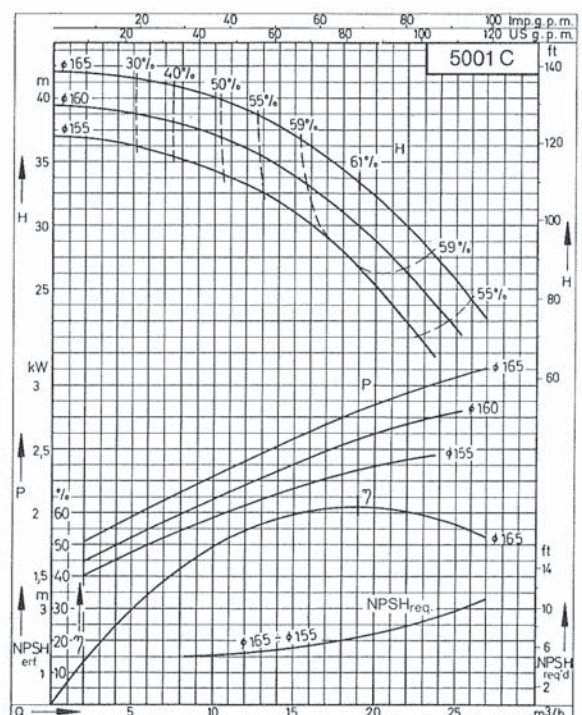
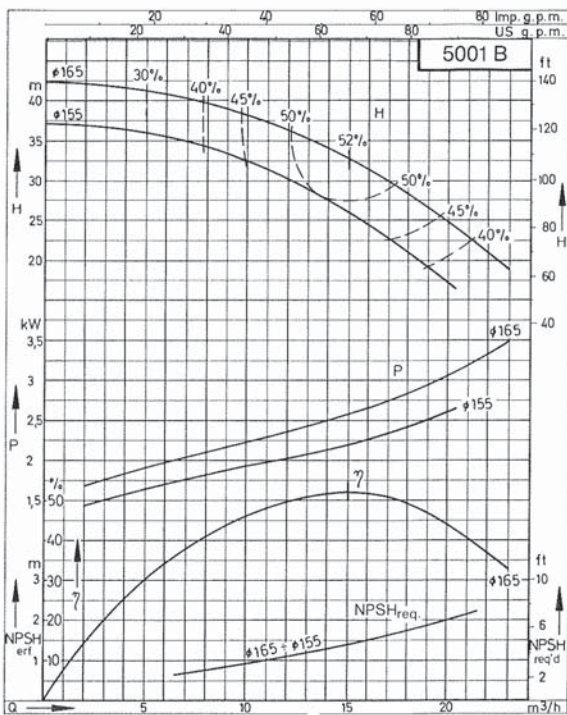
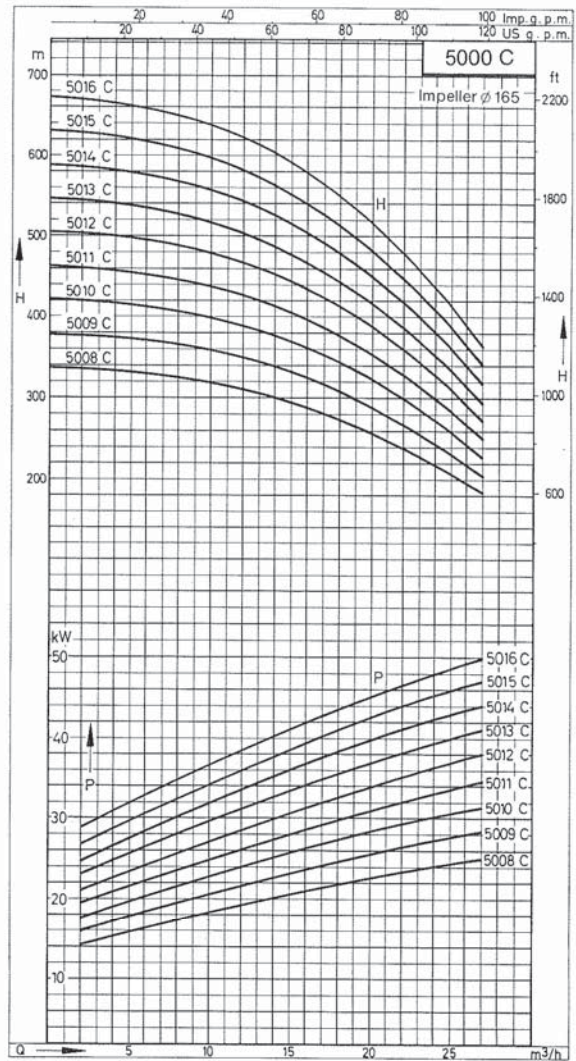
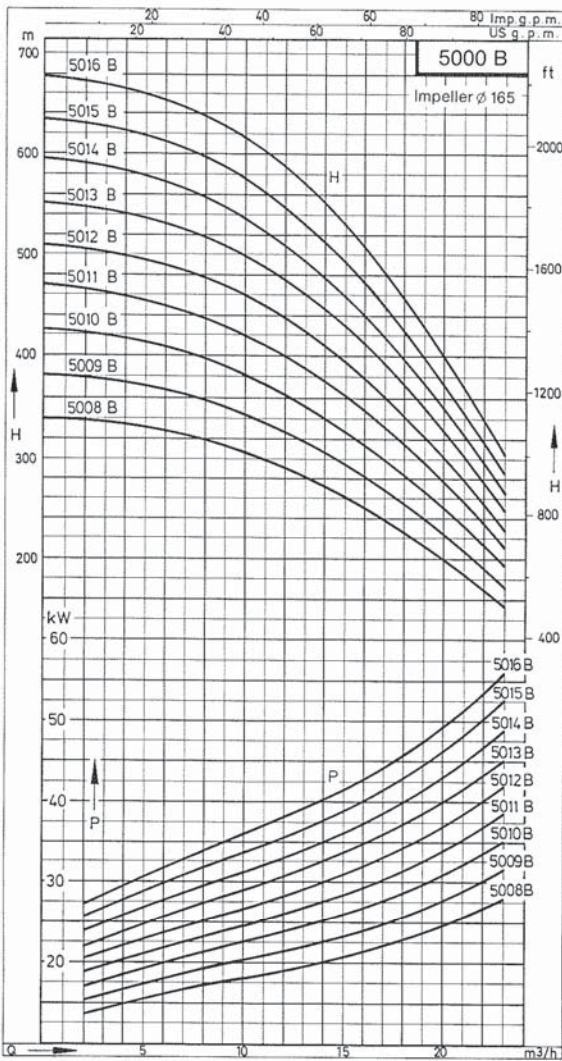
HVG Ring-section type super-pressure centrifugal pump for capacities of up to 1400 m³/h and a maximum discharge head of 500 bar.

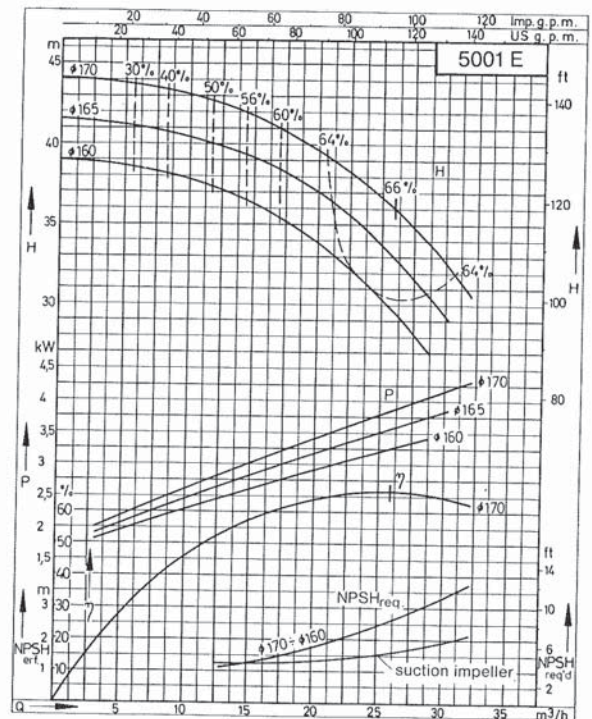
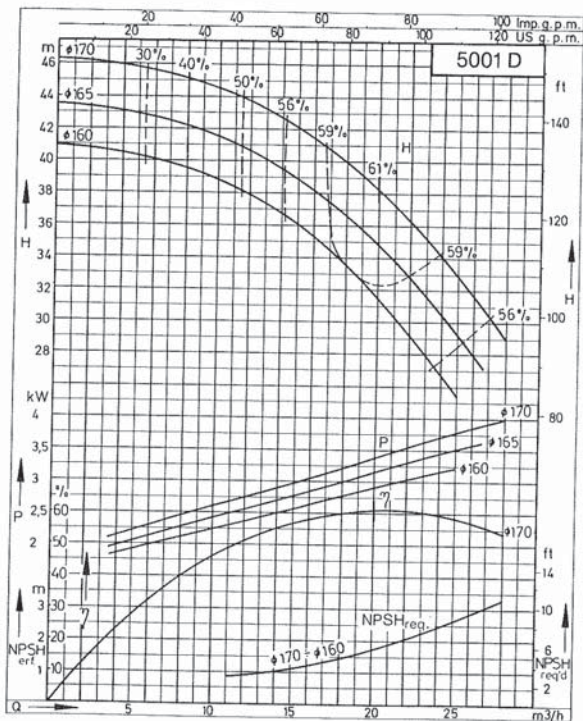
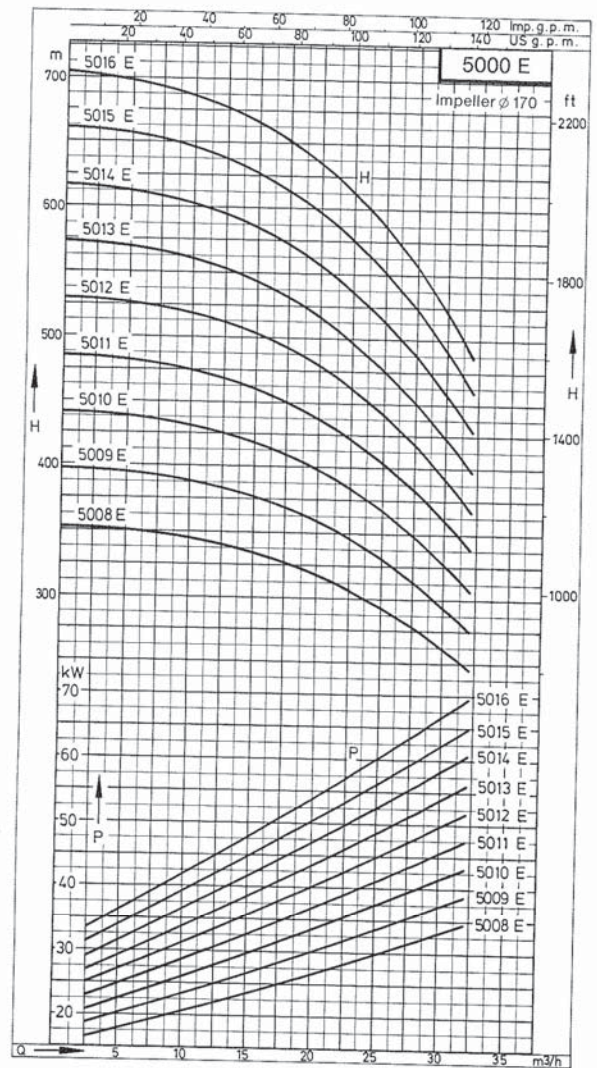
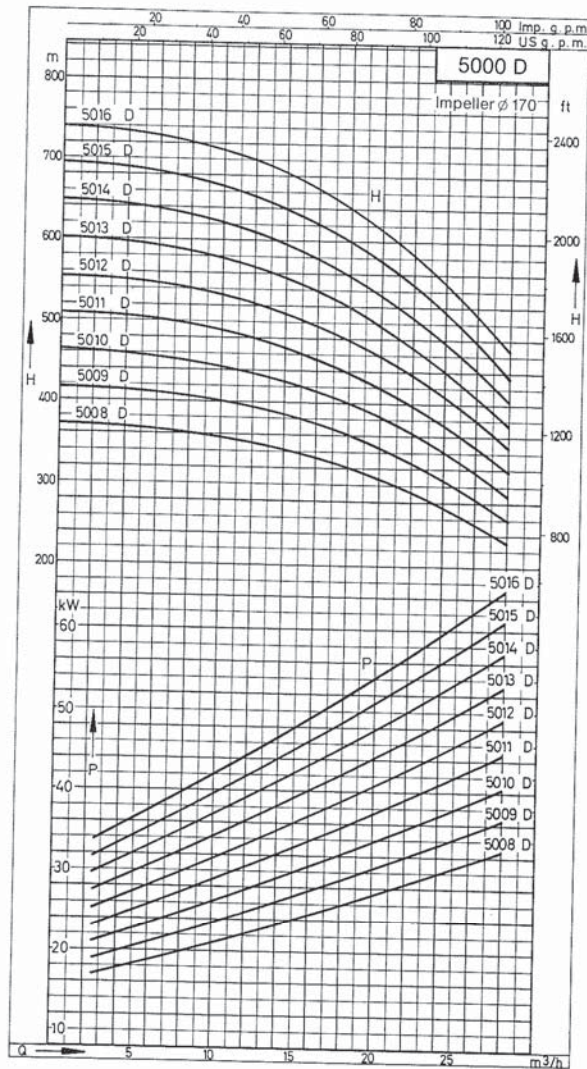
Please send for the required technical documentation on these pumps.

Performance curves

n = 2950 rpm



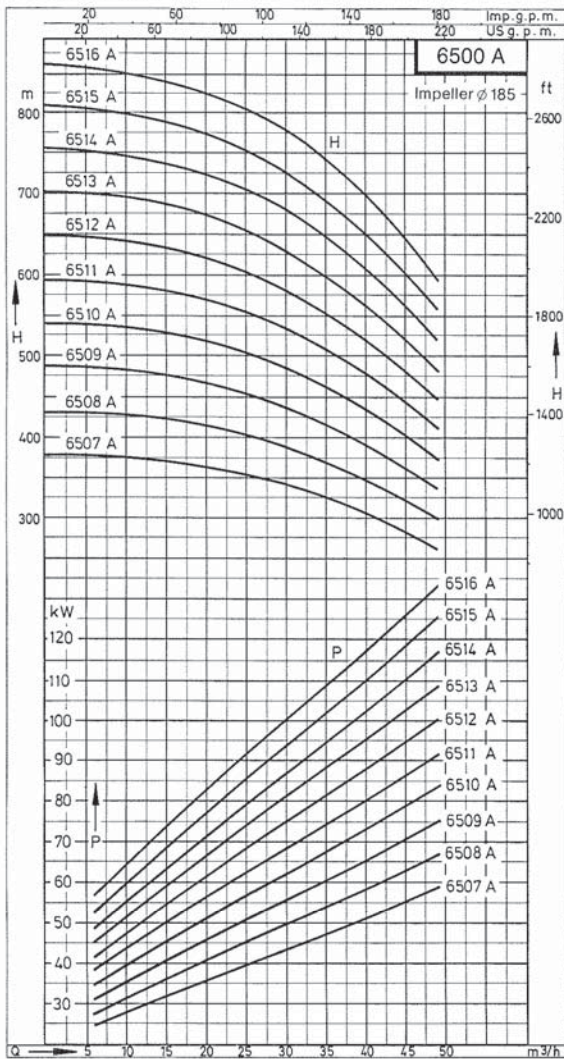




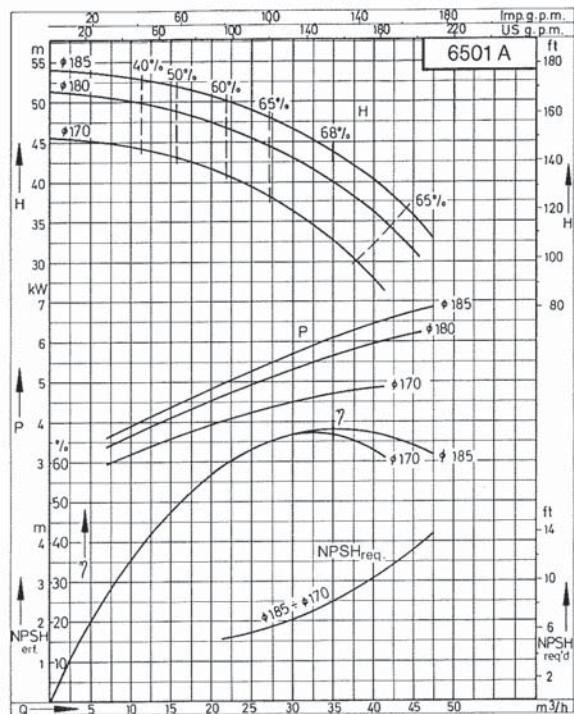
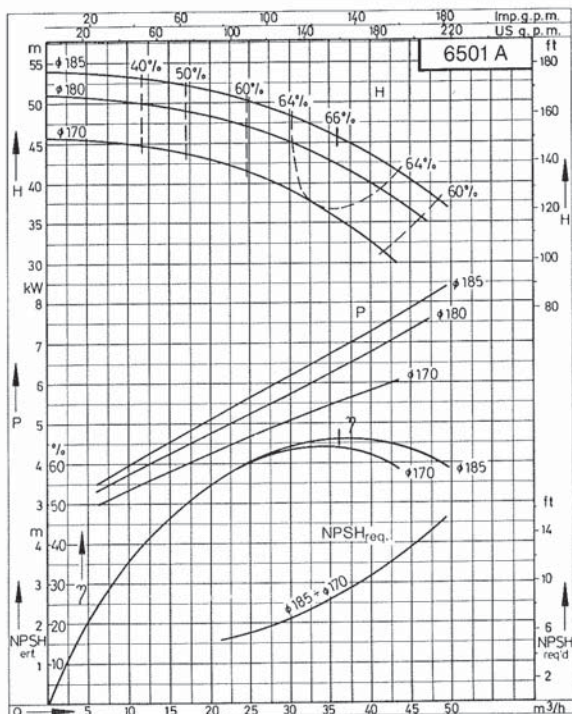
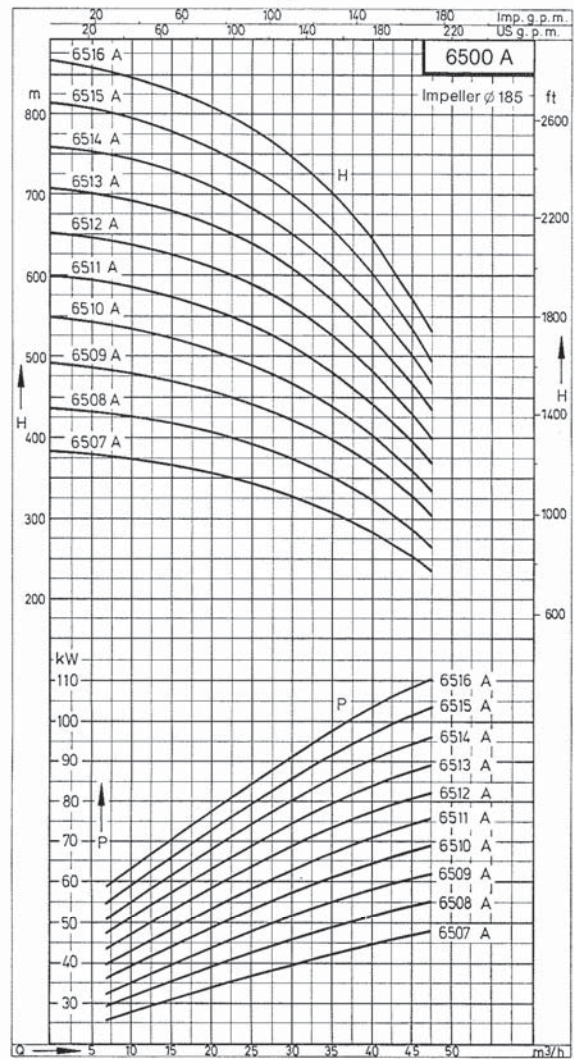
Performance curves

n = 2950 rpm

Impeller material: Nicroguß

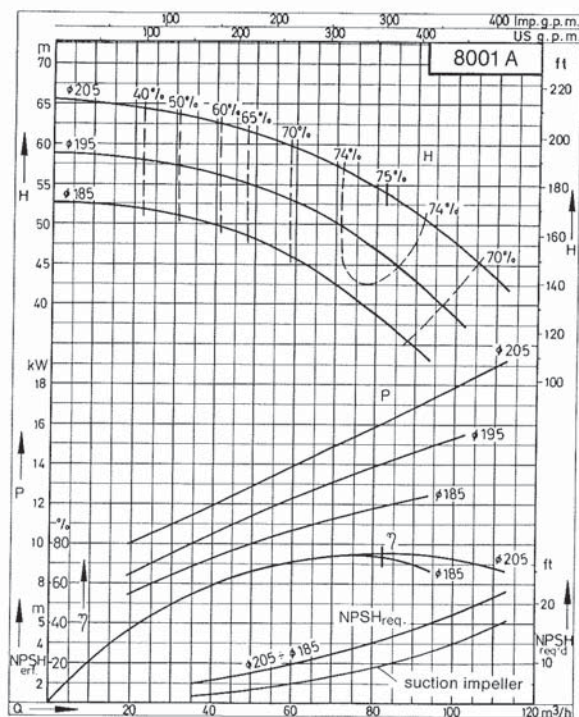
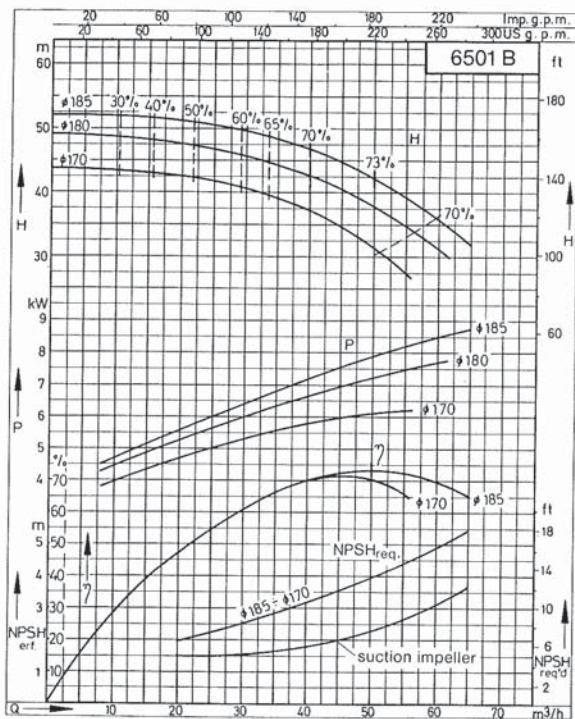
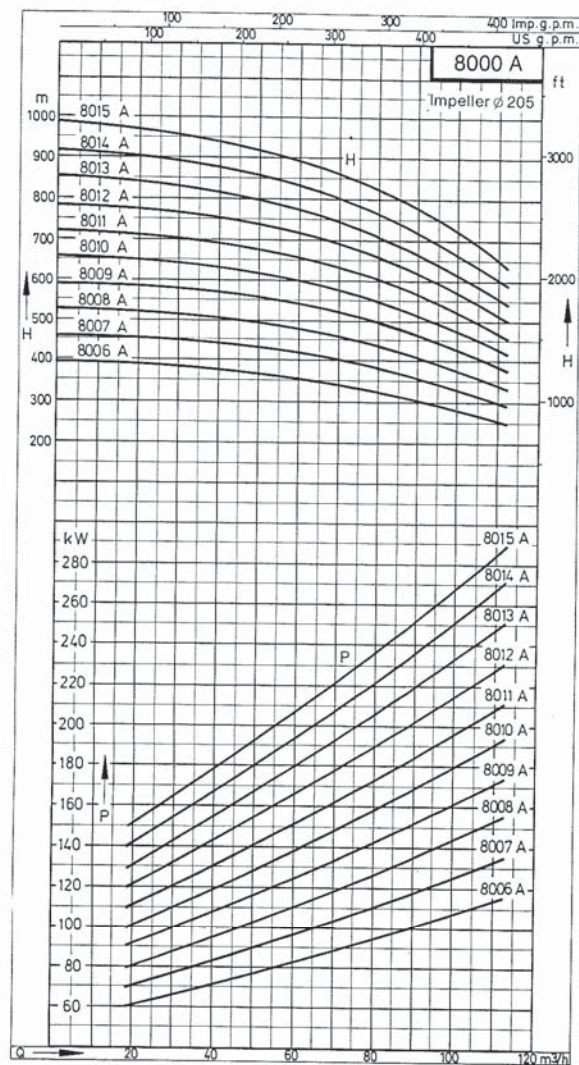
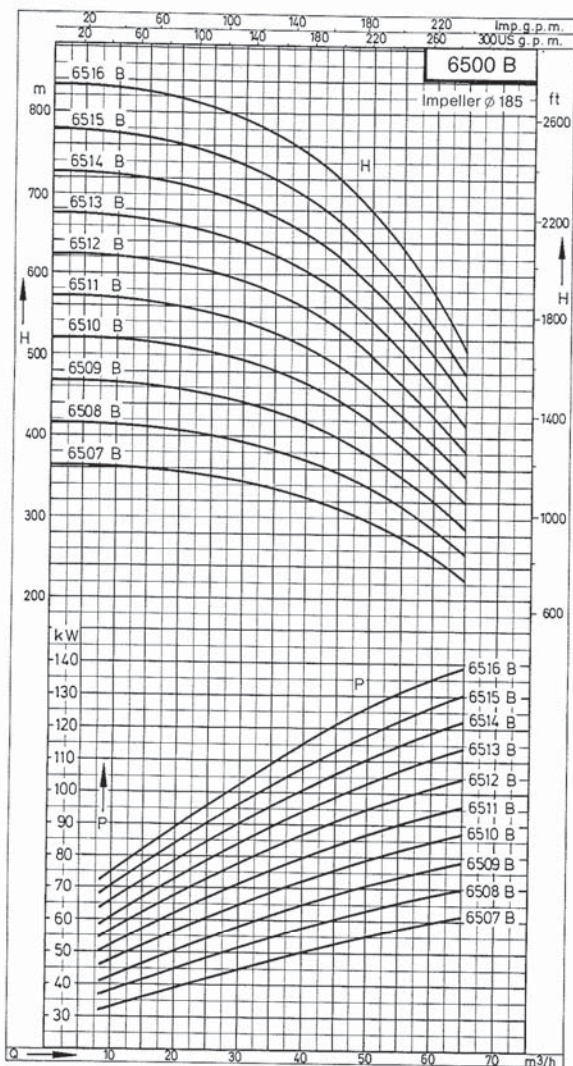


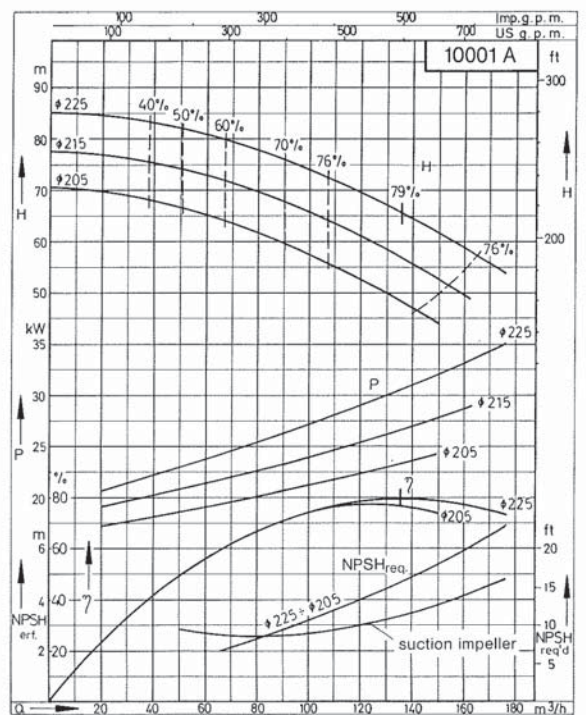
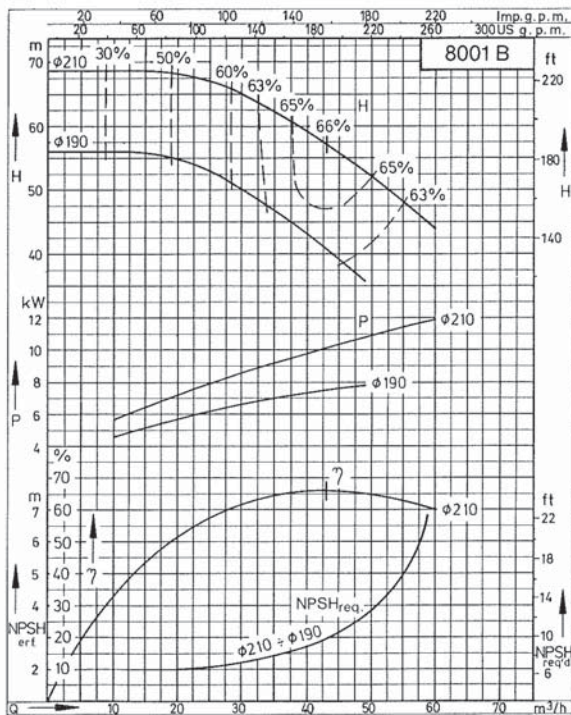
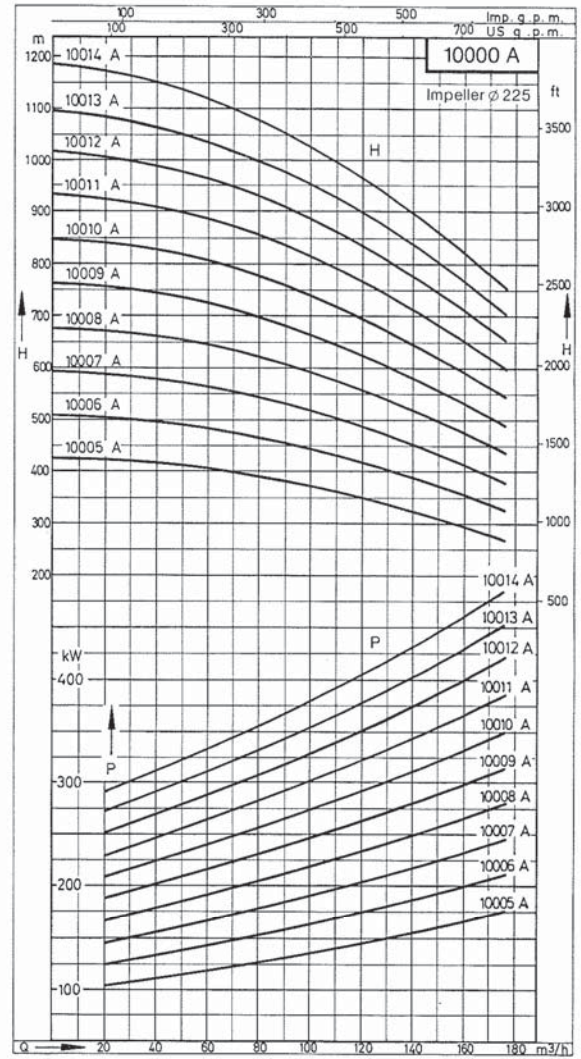
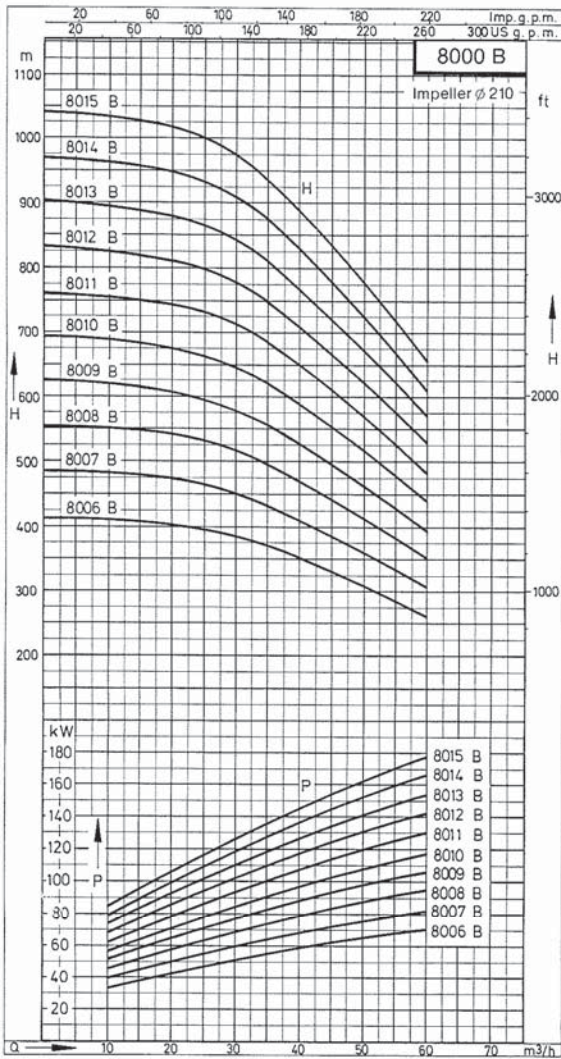
Impeller material: chrome steel

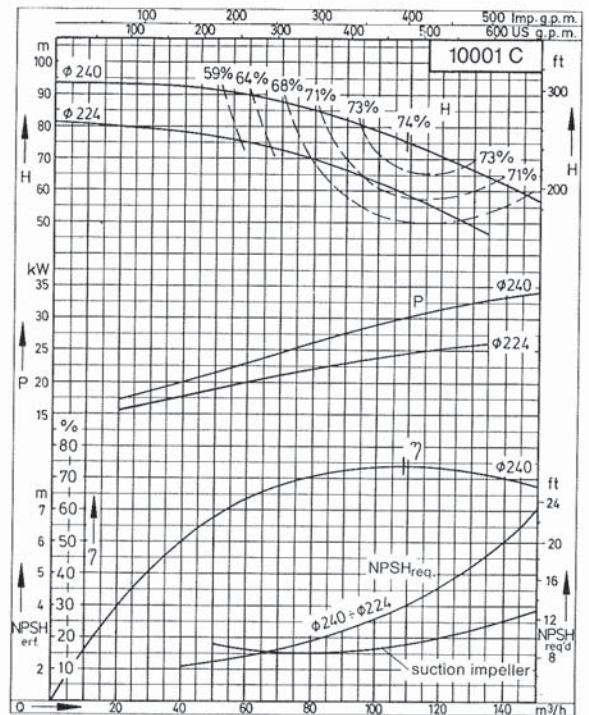
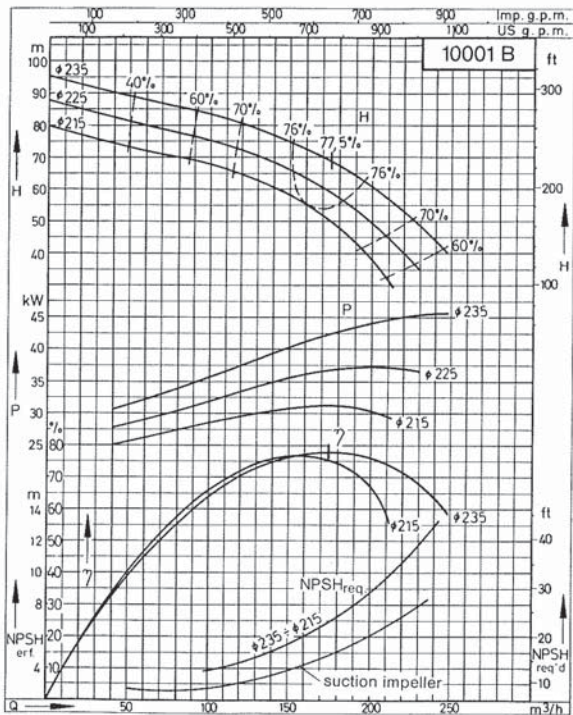
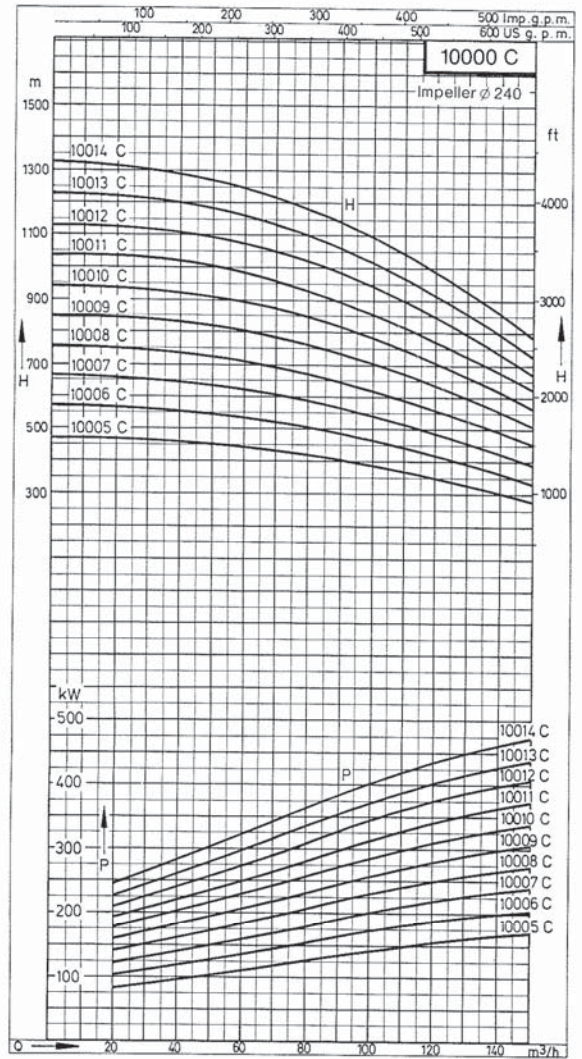
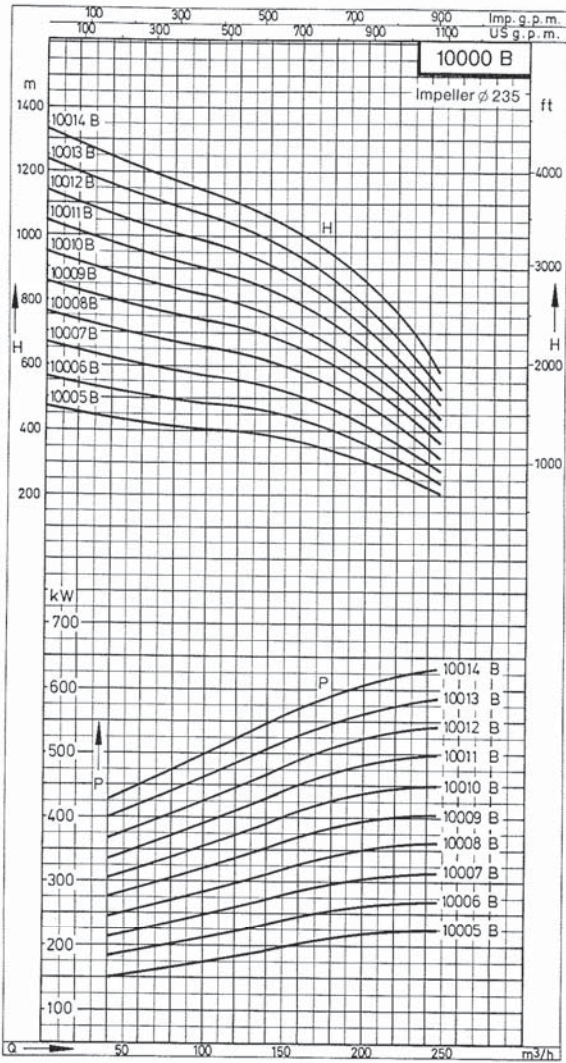


Performance curves

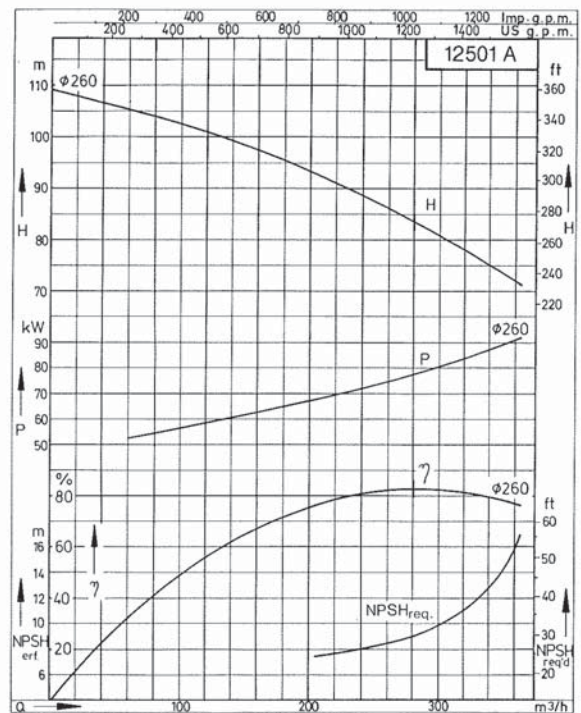
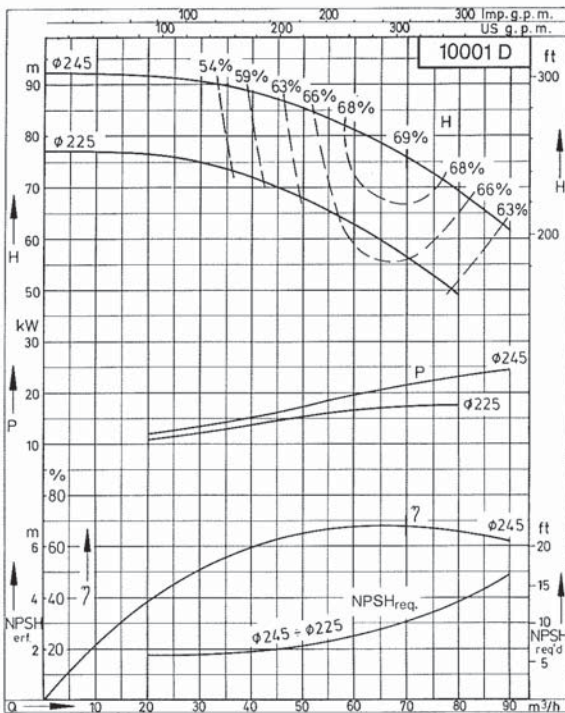
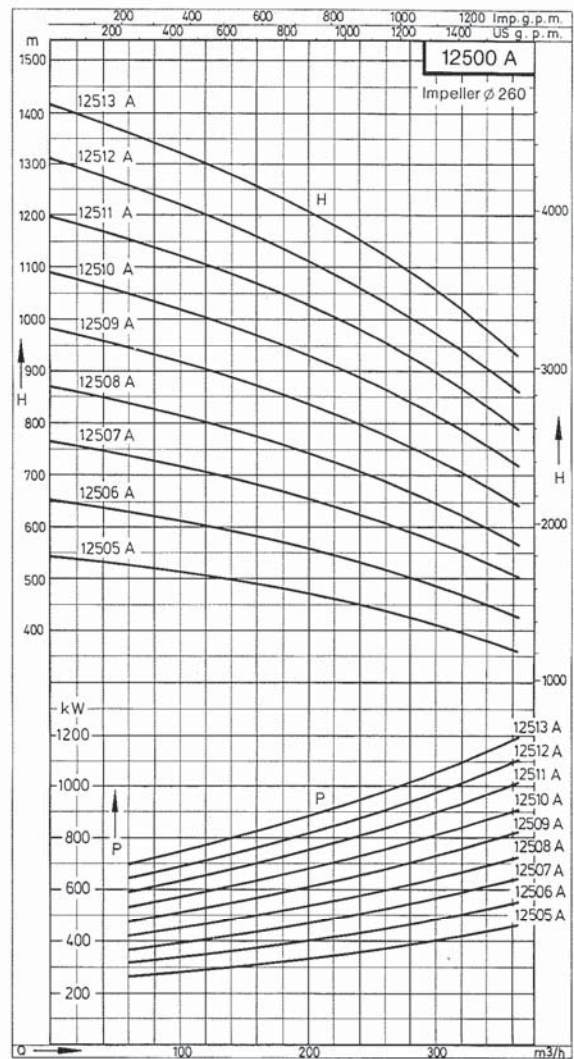
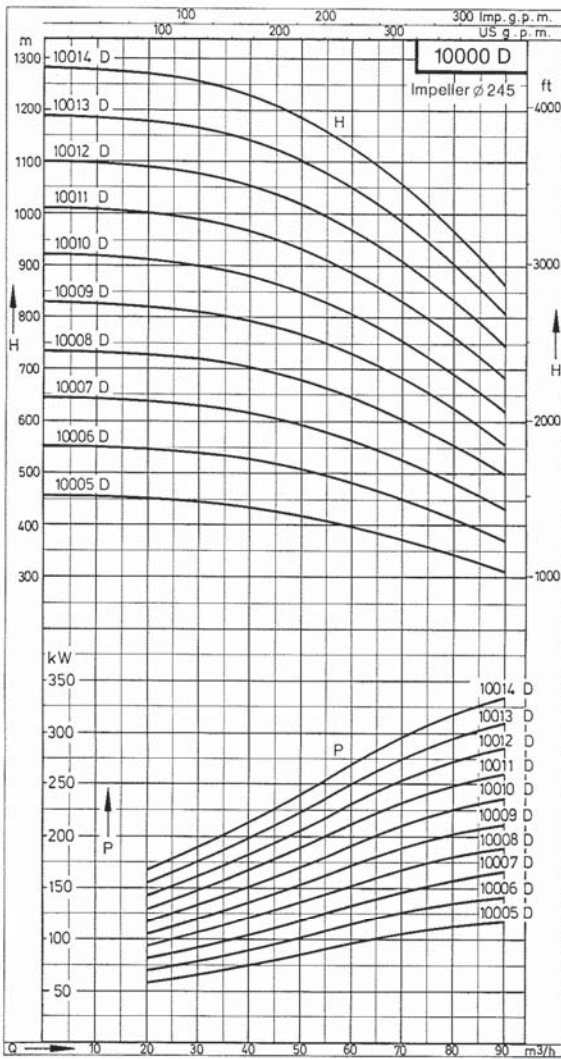
n = 2950 rpm

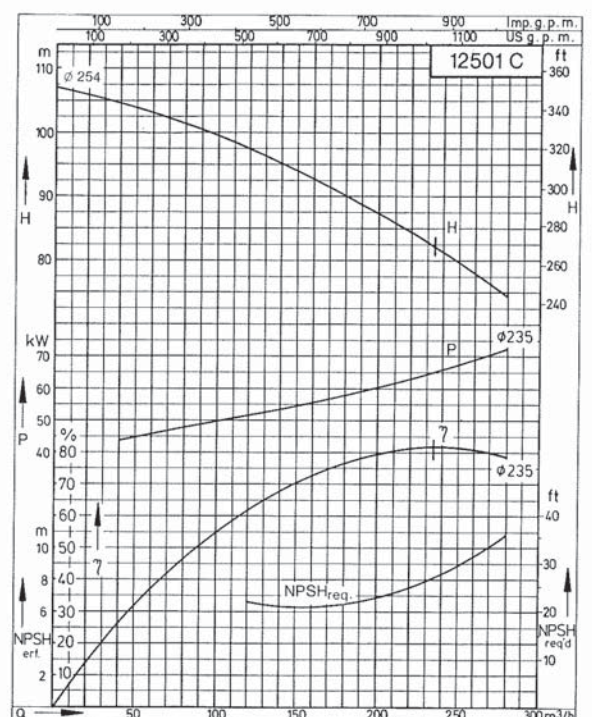
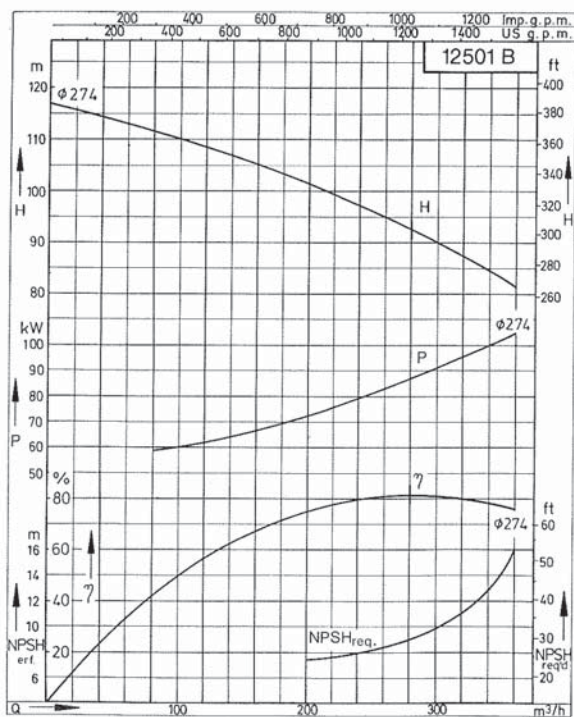
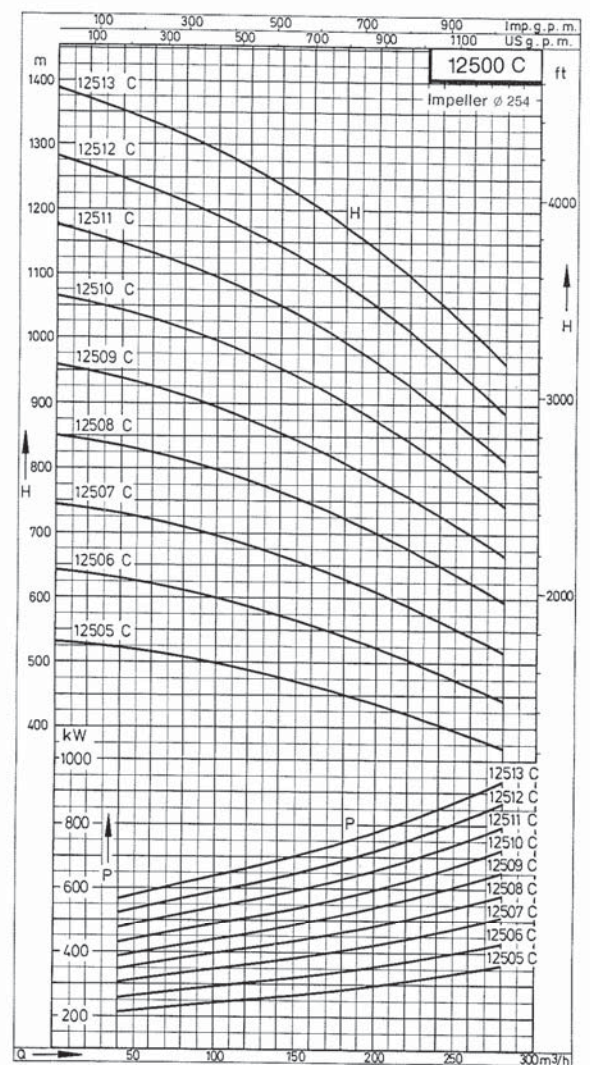
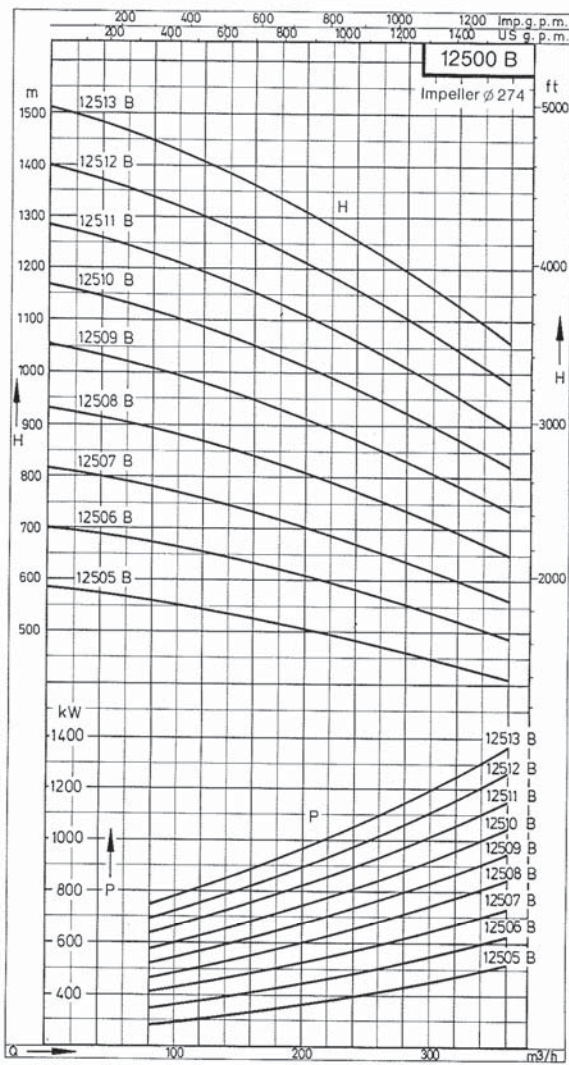


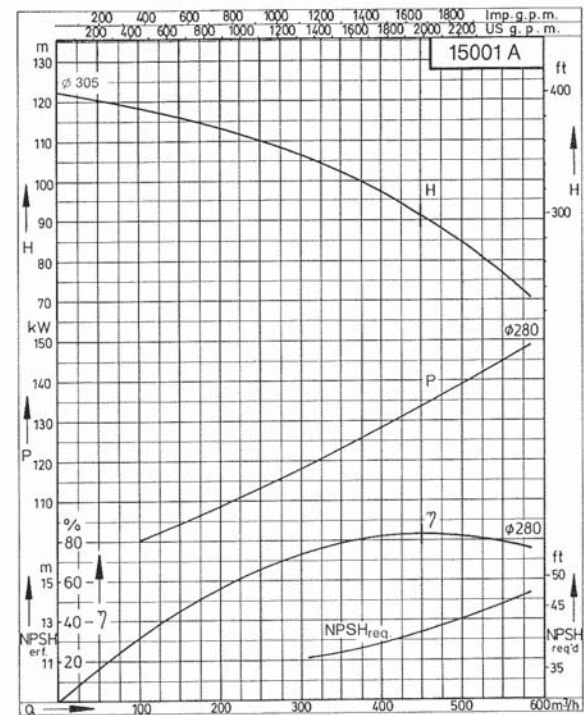
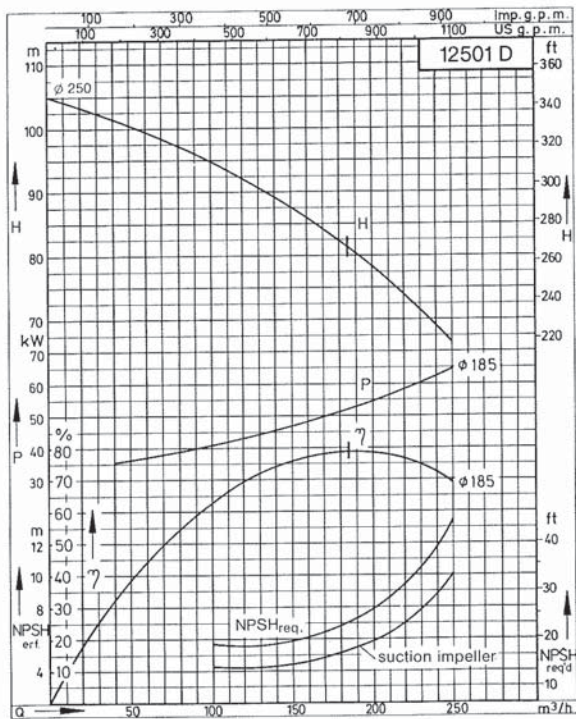
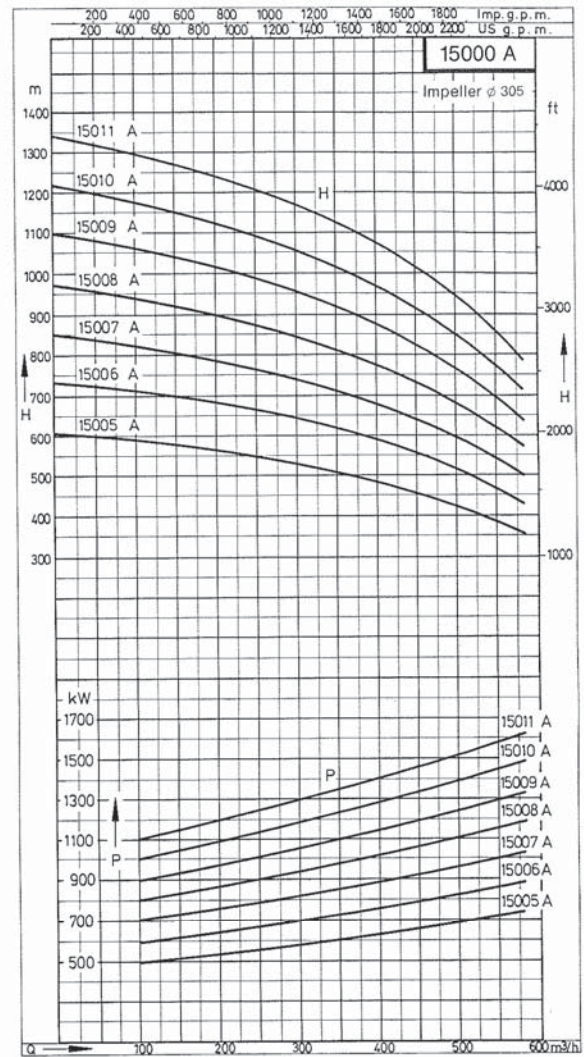
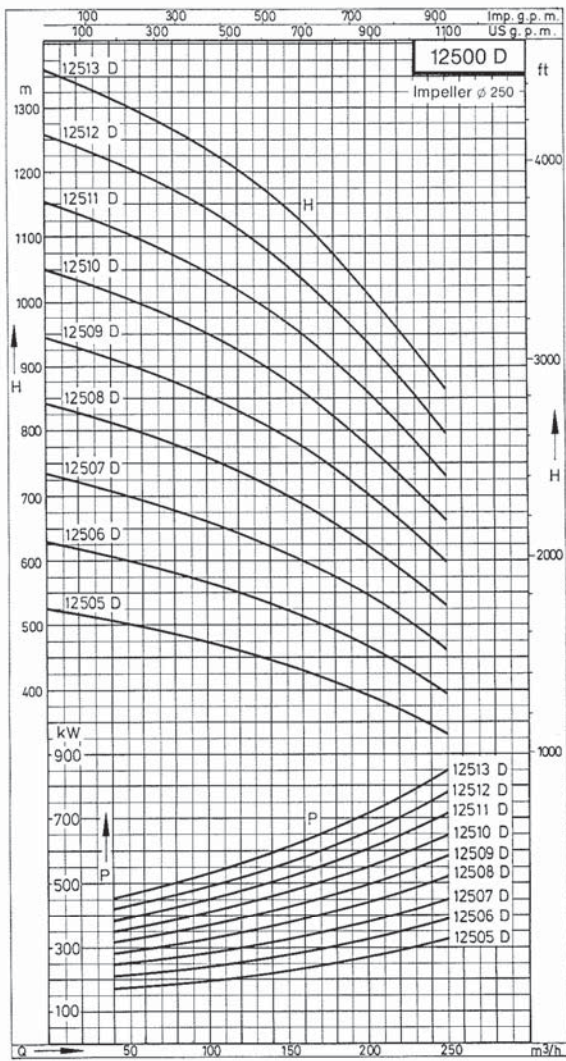




Impeller material: chrome steel







Performance curves

n = 2950 rpm

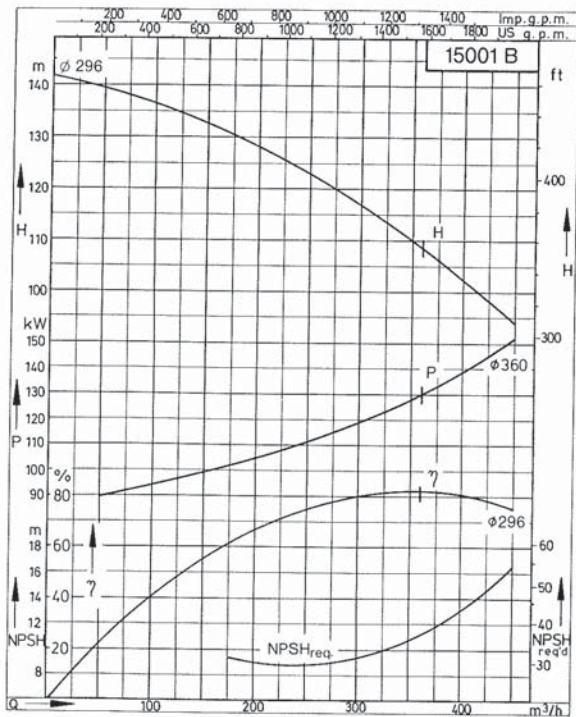
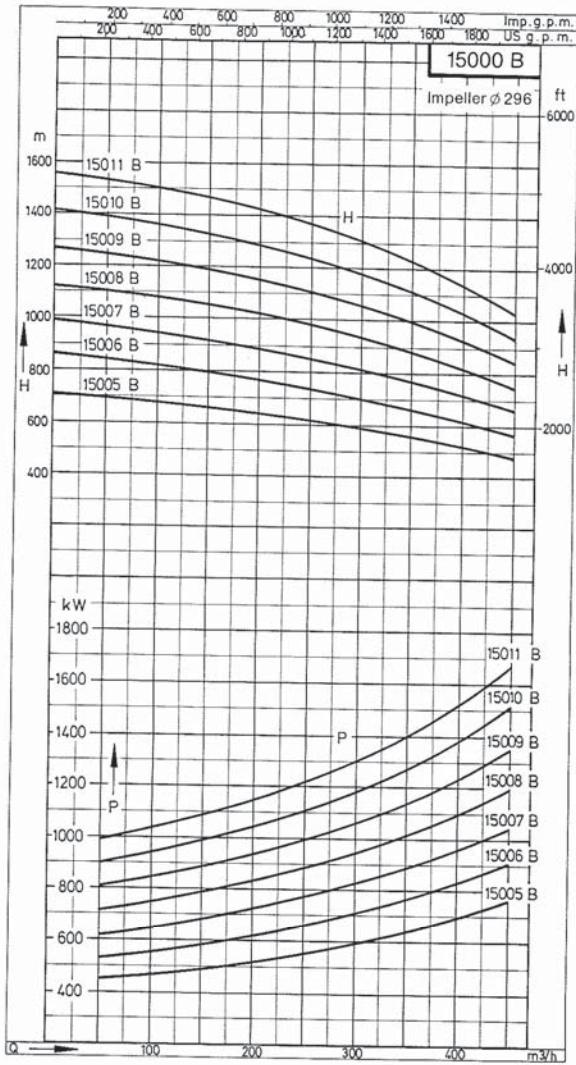
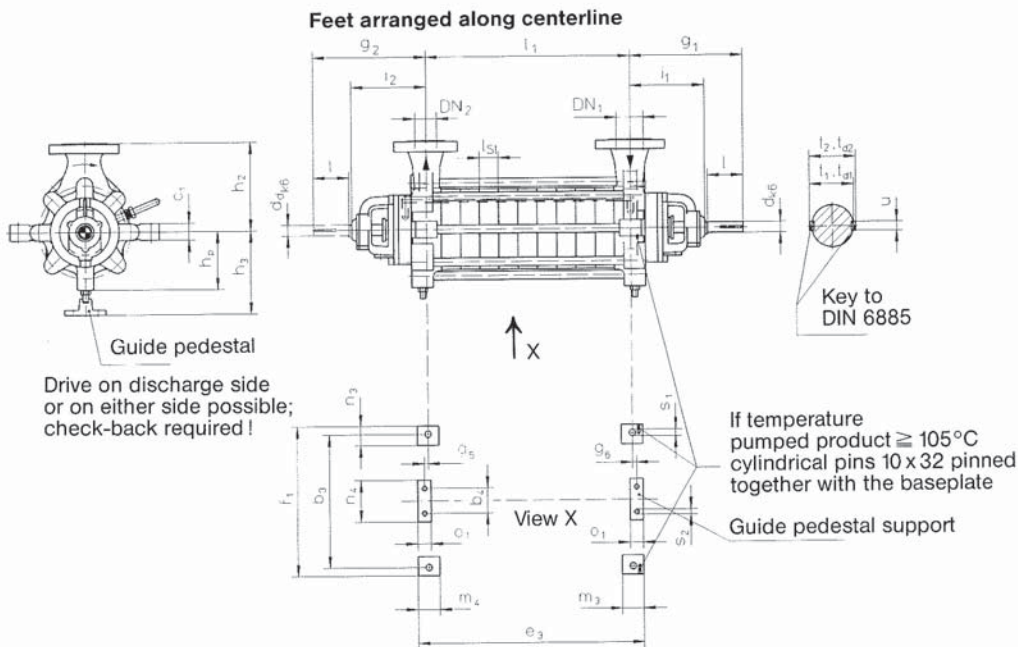
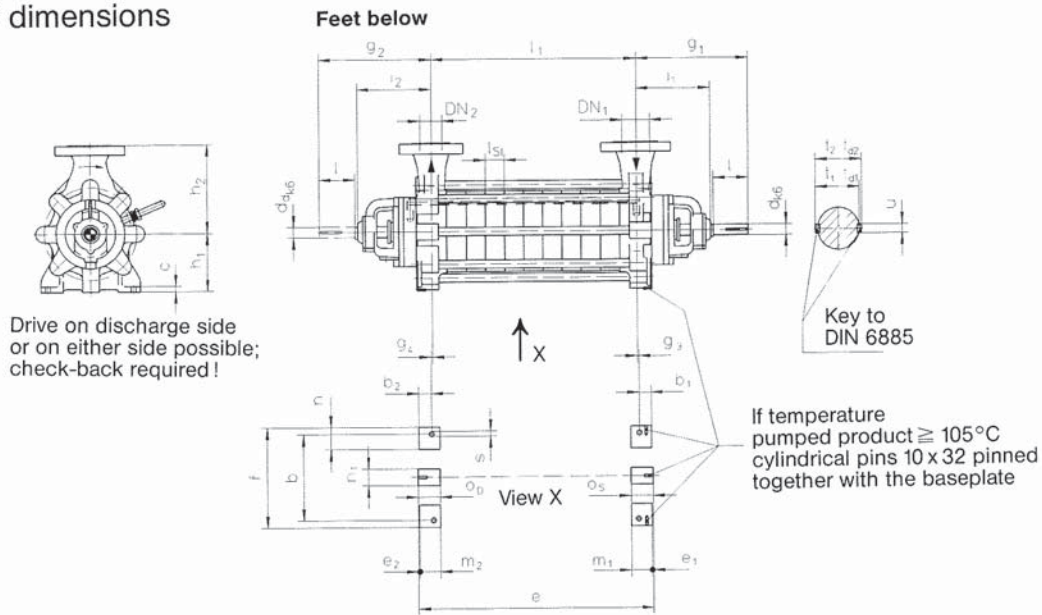


Table of dimensions



Dimensions in mm

Type	Axial thrust balancing	Bearing type	Pump dimensions					Shaft end					Pump dimensions					max. no. of stages				
			DN ₁	DN ₂	h ₁	h _p	h ₂	d	u	t ₁	t ₂	l	d _d	t _{d1}	t _{d2}	g ₁	g ₂		i ₁	i ₂	i ₁ ²	l _{St}
HKGB 4000	Balance disc, or disc/drum combination	B	50	40	150	140	230	22	6	23.5	25	75	22	23.5	25	290	290	205	205	440	40	16
		S											-	-	-		292					
		C											22	23.5	25	300	300	223	338			
		R											-	-	-	-	-	338				
		1; 2											22	23.5	25	305	305	228	236			
	T; U	-											-	-	-	-	290	325	205			
Bal. drum	B	290	325	205	241																	
HKGZ 4000	Disc; drum	C	22	23.5	25	400	400	322	322													
HKGV 4000	Drum	C	Check-back required																			

B = anti-friction bearing, grease-lubricated
 C = anti-friction bearing, oil-lubricated
 1 = sleeve bearing, ring oiled
 2 = sleeve bearing, force feed oiled

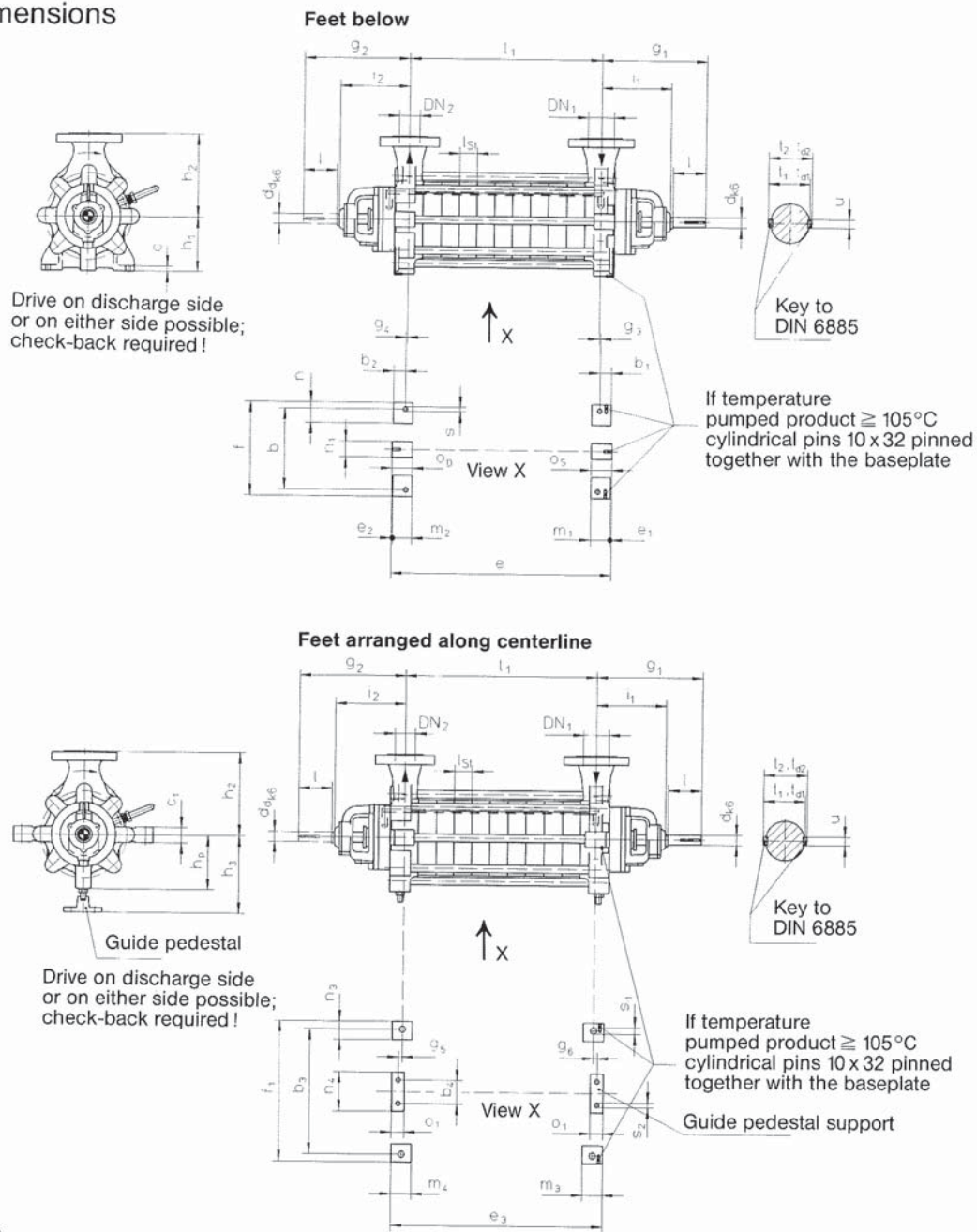
S = anti-friction bearing, grease-lubricated, with lift-off device
 R = anti-friction bearing, oil-lubricated, with lift-off device
 T = sleeve bearing, ring oiled, with lift-off device
 U = sleeve bearing, force feed oiled, with lift-off device

²⁾ For a different number of stages, alter the dimensions by the difference in stage number x dimension l_{St}

Foot dimensions - Feet below															
b	b ₁	b ₂	c	e ₁ ²⁾	e ₁	e ₂	f	g ₃	g ₄	m ₁	m ₂	n	n ₁	o _{S/O}	s
270	30	30	15	509	5	4	310	35	34	50	50	60	40	55	14

Foot dimensions - Feet arranged along centerline														
b ₃	b ₄	c ₁	e ₃ ²⁾	f ₁	g ₅	g ₆	h ₃	m ₃	m ₄	n ₃	n ₄	o ₁	s ₁	s ₂
350	90	50	480	400	0	0	193	40	40	45	150	50	20	18

Table of dimensions



Dimensions in mm

Type	Axial thrust balancing	Bearing type	Pump dimensions							Shaft end						Pump dimensions						max. no. of stages																	
			DN ₁	DN ₂	h ₁	h _p	h ₂	d	u	t ₁	t ₂	l	d _d	t _{d1}	t _{d2}	g ₁	g ₂	i ₁	i ₂	i ₁ ²	i _{st}																		
HKGB 5000	Balance disc, or disc/drum combination	B	65	50	160	150	240	28	6	29.5	31	130	28	29.5	31	360	360	220	305	540	50																		
		S											-	-	-																								
		C											28	29.5	31							365	-	230	346														
		R											-	-	-							375	-	244	360														
		1; 2											28	29.5	31							375	-	244	360														
		T; U											-	-	-							375	-	244	360														
HKGZ 5000	Disc; drum	C	65	50	160	150	240	28	6	29.5	31	130	28	29.5	31	360	395	220	264	540	50																		
		B											28	29.5	31							470	470	357	357														
HKGV 5000	Drum	C											65	50	160							150	240	28	6	29.5	31	130	28	29.5	31	440	475	309	345	540	50		
		B																											28	29.5	31							470	470

B = anti-friction bearing, grease-lubricated
 C = anti-friction bearing, oil-lubricated
 1 = sleeve bearing, ring oiled
 2 = sleeve bearing, force feed oil

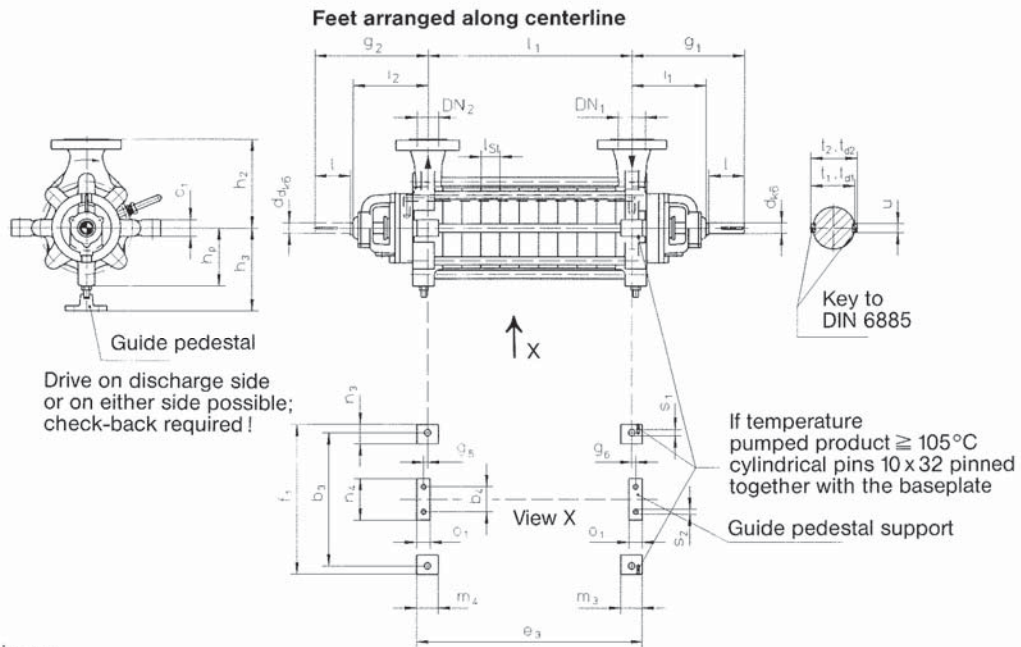
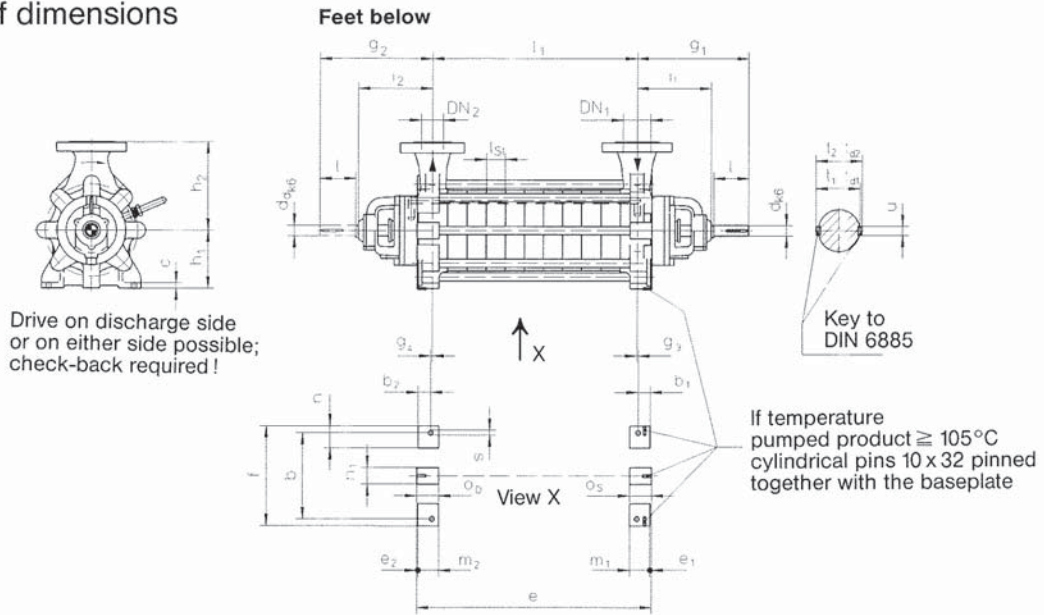
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 R = anti-friction bearing, oil-lubricated, with lift-off device
 T = sleeve bearing, ring oiled, with lift-off device
 U = sleeve bearing, force feed oiled, with lift-off device

²⁾ For a different number of stages, alter the dimensions by the difference in stage number x dimension i_{st}

b	b ₁	b ₂	c	e ₁ ²⁾	e ₂	f	g ₃	g ₄	m ₁	m ₂	n	n ₁	o _s /o _d	s	
280	35	34	15	619	5	5	320	40	39	57	56	55	40	62	14

b ₃	b ₄	c ₁	e ₃ ²⁾	f ₁	g ₅	g ₆	h ₃	m ₃	m ₄	n ₃	n ₄	o ₁	s ₁	s ₂
380	90	50	585	430	0	0	230	45	45	45	150	50	20	18

Table of dimensions



Dimensions in mm

Type	Axial thrust balancing	Bearing type	Pump dimensions					Shaft end					Pump dimensions					max. no. of stages				
			DN ₁	DN ₂	h ₁	h _p	h ₂	d	u	t ₁	t ₂	l	d _d	t _{d1}	t _{d2}	g ₁	g ₂		i ₁	i ₂	i ₁ ² (10 Stages)	l _{St}
HKGB 6500	Balance disc, or disc/drum combination	B	80	65	190	180	280	32	8	33.9	35.8	130	32	33.9	35.8	380	380	240	240	645	60	
		S											-	-	-		240	332				
		C											32	33.9	35.8	390	390	255	378			
		R											-	-	-		395	270	385			
		1; 2											32	33.9	35.8	395	262	385				
		T; U											-	-	-	-	-	-				
Bal. drum	B	32	33.9	35.8	380	425	240	292														
HKGZ 6500	Disc; drum	C											32	33.9	35.8	470	510	335	375			
HKGV 6500	Drum	C																				14

B = anti-friction bearing, grease-lubricated
 C = anti-friction bearing, oil-lubricated
 1 = sleeve bearing, ring oiled
 2 = sleeve bearing, force feed oiled

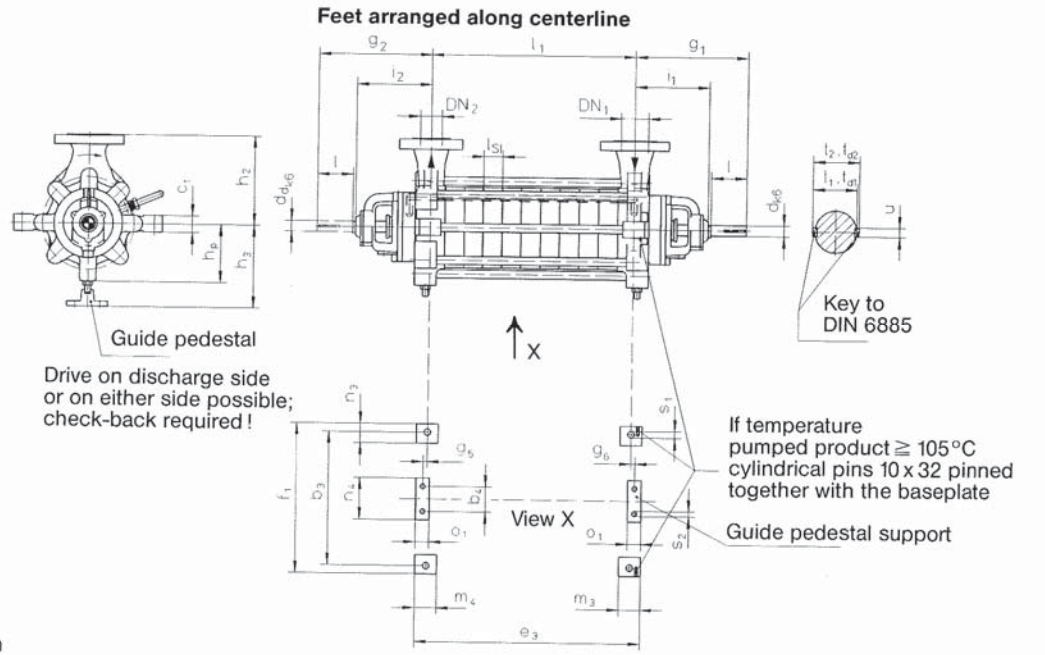
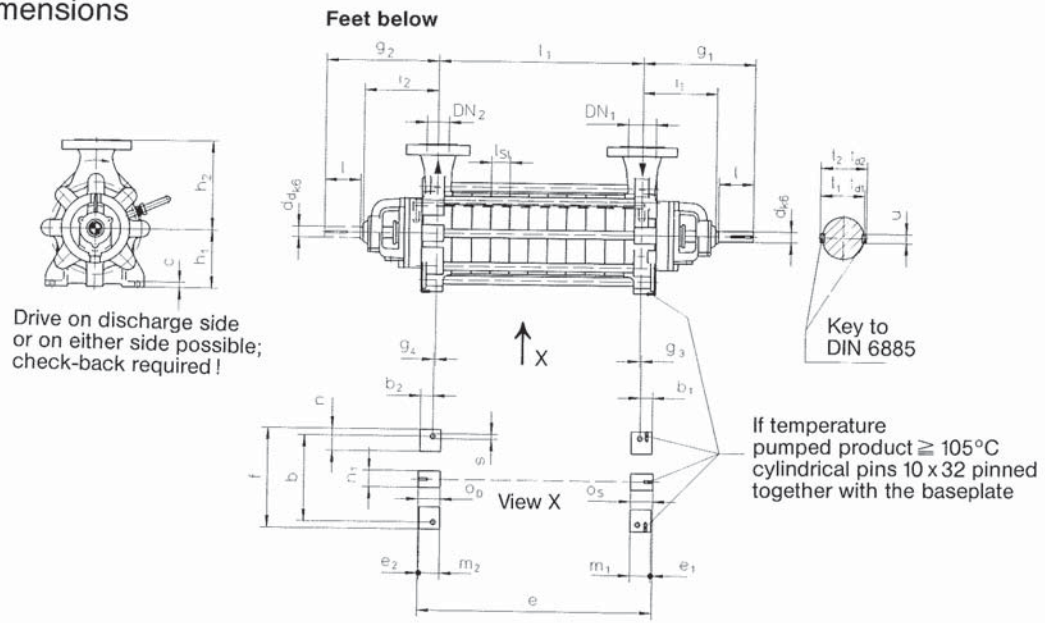
S = anti-friction bearing, grease-lubricated, with lift-off device
 R = anti-friction bearing, oil-lubricated, with lift-off device
 T = sleeve bearing, ring oiled, with lift-off device
 U = sleeve bearing, force feed oiled, with lift-off device

²⁾ For a different number of stages, alter the dimensions by the difference in stage number x dimension l_{St}

Foot dimensions – Feet below															
b	b ₁	b ₂	c	e ₂ ^(10 Stages)	e ₁	e ₂	f	g ₃	g ₄	m ₁	m ₂	n	n ₁	o _S / o _D	s
295	42	44	15	744	8	5	340	50	49	67	69	75	55	75	18

Foot dimensions – Feet arranged along centerline														
b ₃	b ₄	c ₁	e ₃ ^(10 Stages)	f ₁	g ₅	g ₆	h ₃	m ₃	m ₄	n ₃	n ₄	o ₁	s ₁	s ₂
440	90	50	725	500	0	0	260	80	80	70	150	50	20	18

Table of dimensions



Dimensions in mm

Type	Axial thrust balancing	Bearing type	Pump dimensions					Shaft end						Pump dimensions						max. no. of stages		
			DN ₁	DN ₂	h ₁	h _p	h ₂	d	u	t ₁	t ₂	l	d _d	t _{d1}	t _{d2}	g ₁	g ₂	i ₁	i ₂		l ₁ ²⁾	l _{S1}
HKGB 8000	Balance disc, or disc/drum combination	B	100	80	210	200	320	38	8	39.9	41.8	132	38	39.9	41.8	410	410	269	269	745	70	15
		S											-	-	-		269	368				
		C											38	39.9	41.8	420	420	283	282			
		R											-	-	-		410	410				
		1;2											38	33.9	41.8	420	295	288	415			
	T; U	-											-	-	-	288	415					
Bal. drum	B	410	455	269	322	410	455	269	322	410	455	269	322									
HKGZ 8000	Disc; drum	C											38	33.9	41.8	560	560	430	430			
HKGV 8000	Drum	C														485	525	350	390			14

B = anti-friction bearing, grease-lubricated
 C = anti-friction bearing, oil-lubricated
 1 = sleeve bearing, ring oiled
 2 = sleeve bearing, force feed oiled

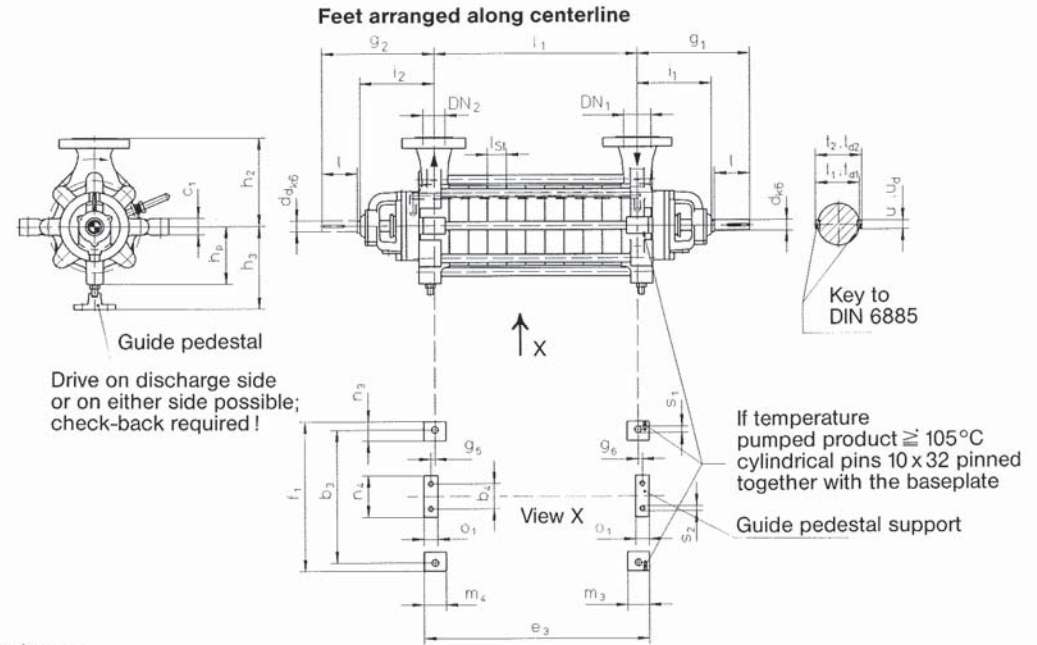
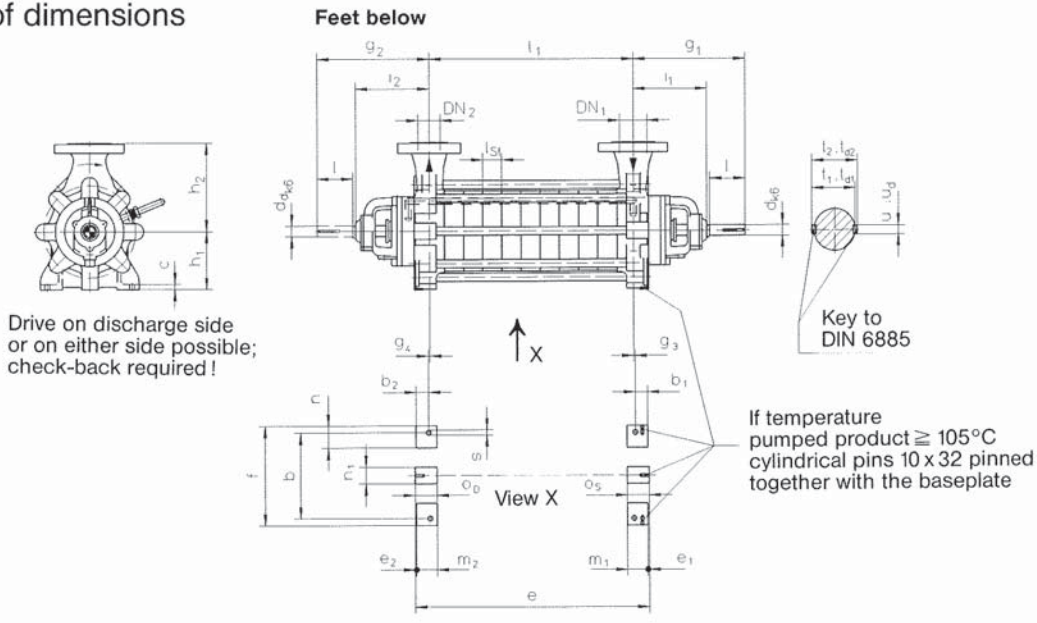
S = anti-friction bearing, grease-lubricated, with lift-off device
 R = anti-friction bearing, oil-lubricated, with lift-off device
 T = sleeve bearing, ring oiled, with lift-off device
 U = sleeve bearing, force feed oiled, with lift-off device

²⁾ For a different number of stages, alter the dimensions by the difference in stage number x dimension l_{S1}

b	b ₁	b ₂	c	e ₂ ²⁾	e ₁	e ₂	f	g ₃	g ₄	m ₁	m ₂	n	n ₁	o _S /o _D	s
310	50	50	20	855	5	5	360	55	55	75	75	80	60	80	18

b ₃	b ₄	c ₁	e ₃ ²⁾	f ₁	g ₅	g ₆	h ₃	m ₃	m ₄	n ₃	n ₄	o ₁	s ₁	s ₂
480	90	60	825	540	0	0	280	80	80	70	150	50	24	18

Table of dimensions



Dimensions in mm

Type	Axial thrust balancing	Bearing type	Pump dimensions					Shaft end							Pump dimensions					max. no. of stages			
			DN ₁	DN ₂	h ₁	h _p	h ₂	d	u	t ₁	t ₂	l	u _d	d _d	t _{d1}	t _{d2}	g ₁	g ₂	i ₁		i ₂	l ₁ ²⁾	l _{St}
HKGB 10000	Balance disc, or disc/drum combination	B	125	100	225	225	340	48	10	50.3	52.6	140	8	38	39.9	41.8	450	300	460	315	845	80	
		S												-	-	-							400
		C												38	39.9	41.8	460	315					453
		R												-	-	-	485	339					512
		1; 2												42	44.3	46.3	485	339					512
HKGV 10000	Bal. drum	T; U	-	-	-	-	-	-	-	-	-	-	-	-	-	450	495	300	354	-	-		
		B	450	495	300	354	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
HKGZ 10000	Disc; drum ^{s)}	C	-	-	-	-	48	10	50.3	52.6	-	8	38	39.9	41.8	540	570	395	425	-	-	13	
HKGV 10000	Drum	C	-	-	-	-	-	-	-	-	-	-	-	-	-	540	575	395	430	-	-	13	

B = anti-friction bearing, grease-lubricated
 C = anti-friction bearing, oil-lubricated
 1 = sleeve bearing, ring oiled
 2 = sleeve bearing, force feed oiled

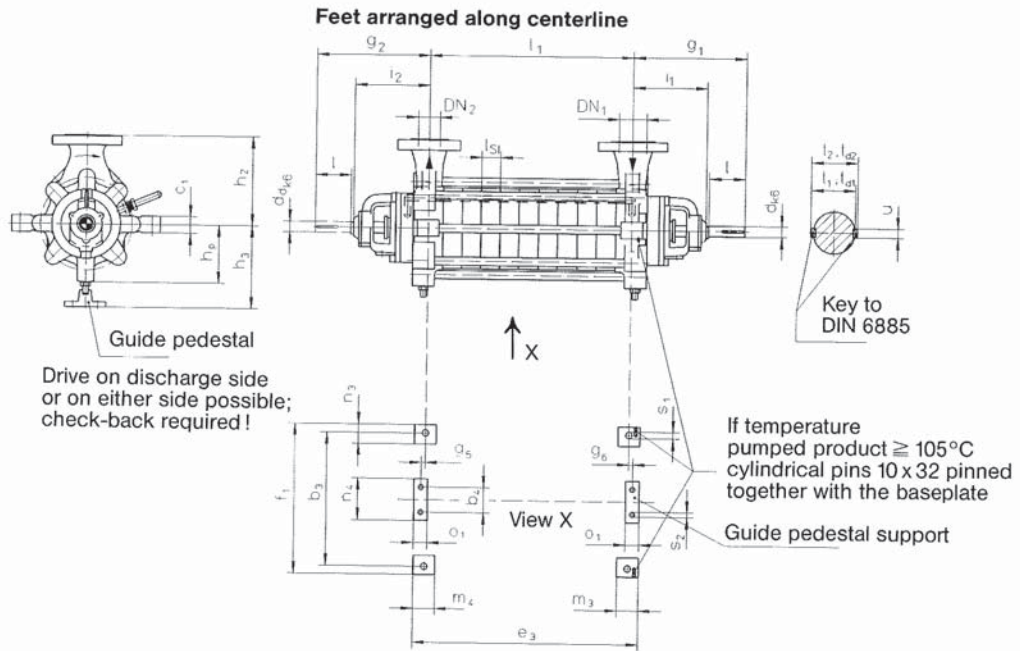
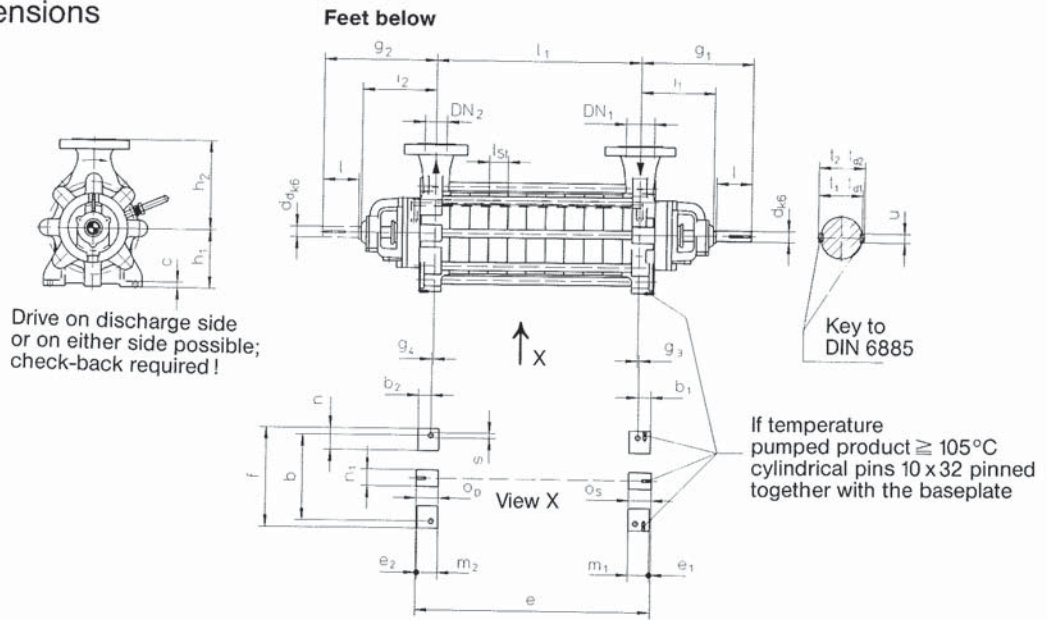
S = anti-friction bearing, grease-lubricated, with lift-off device
 R = anti-friction bearing, oil-lubricated, with lift-off device
 T = sleeve bearing, ring oiled, with lift-off device
 U = sleeve bearing, force feed oiled, with lift-off device

²⁾ For a different number of stages, alter the dimensions by the difference in stage number x dimension l_{St}
³⁾ Check-back required, if pump is to be fitted with a balance drum

b	b ₁	b ₂	c	e ₂ ²⁾	e ₁	e ₂	f	g ₃	g ₄	m ₁	m ₂	n	n ₁	o _S /o _D	s
325	25	25	20	974	0	0	380	65	64	65	64	85	65	80	18

b ₃	b ₄	c ₁	e ₃ ²⁾	f ₁	g ₅	g ₆	h ₃	m ₃	m ₄	n ₃	n ₄	o ₁	s ₁	s ₂
520	90	60	925	580	9	10	305	80	80	70	150	50	24	18

Table of dimensions



Dimensions in mm

Type	Axial thrust balancing	Bearing type	Pump dimensions					Shaft end						Pump dimensions						max. no. of stages							
			DN ₁	DN ₂	h ₁	h _p	h ₂	d	u	t ₁	t ₂	l	d _d	t _{d1}	t _{d2}	g ₁	g ₂	i ₁	i ₂		i ₁ ²	l _{st}					
HKGB 12500	Balance disc, or disc/drum combination	B	150	125	265	265	400	52	12	54.1	56.2	150	42	44.1	46.2	525	500	375	350	(8 Stages)	930	105	13				
		S											-	-	-									458			
		C											42	44.1	46.2									535	510	385	360
		R											-	-	-									535	-	385	515
		1; 2											48	50.1	52.2									520	-	384	531
		T; U											-	-	-									545	520	395	531

B = anti-friction bearing, grease-lubricated
 C = anti-friction bearing, oil-lubricated
 1 = sleeve bearing, ring oiled
 2 = sleeve bearing, force feed oiled

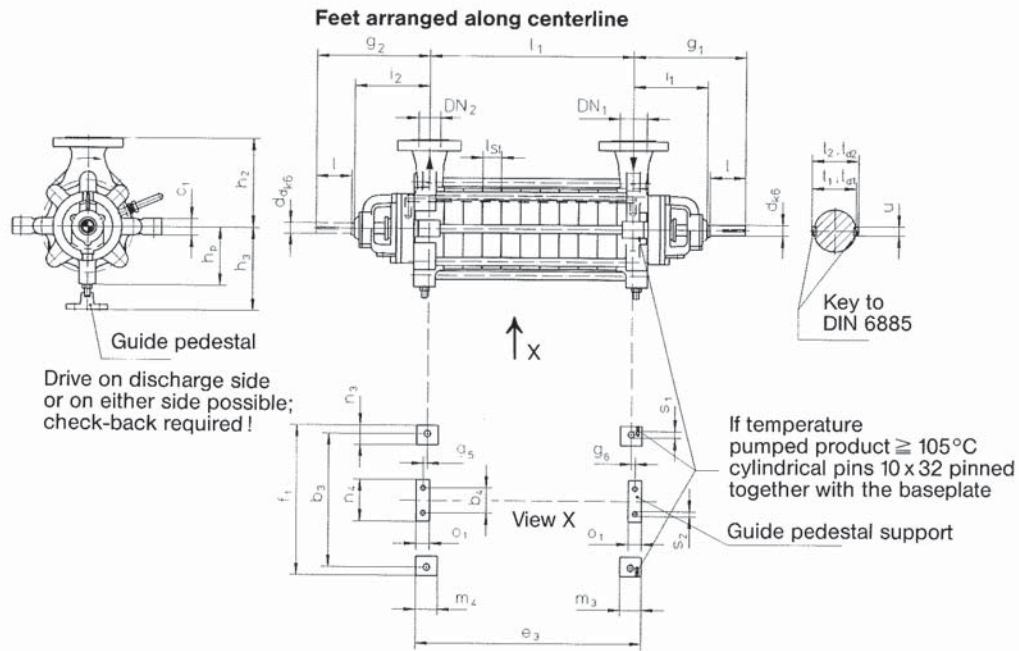
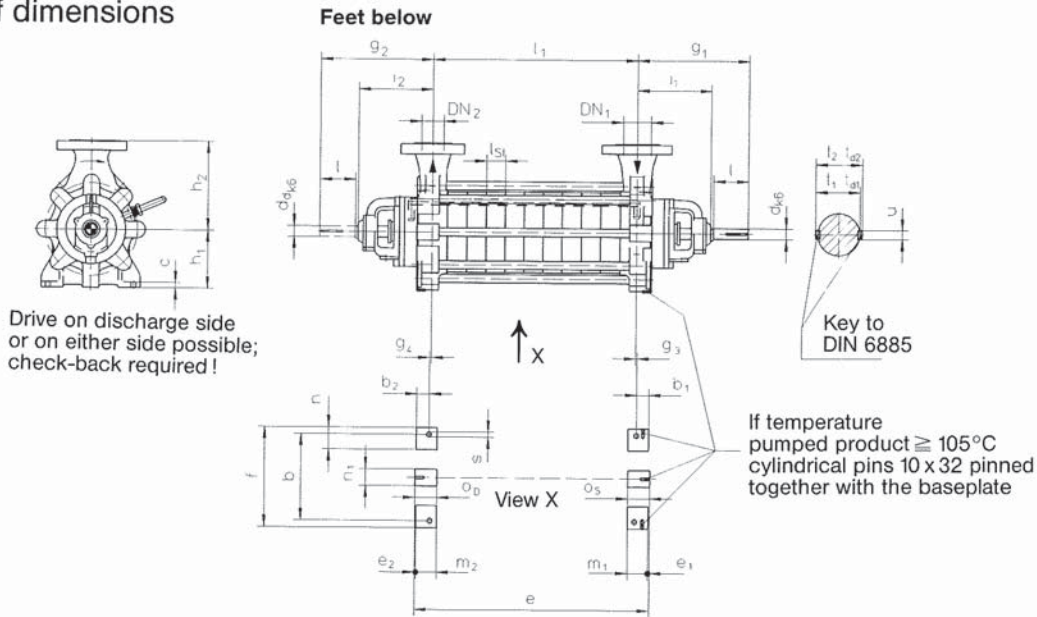
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 R = anti-friction bearing, oil-lubricated, with lift-off device
 T = sleeve bearing, ring oiled, with lift-off device
 U = sleeve bearing, force feed oiled, with lift-off device

2) For a different number of stages, alter the dimensions by the difference in stage number x dimension l_{st}

b	b ₁	b ₂	c	e ₂ ² (8 Stages)	e ₁	e ₂	f	g ₃	g ₄	m ₁	m ₂	n	n ₁	o _s	o _D	s
400	30	30	22	1134	40	14	460	45	45	75	75	90	65	115	110	22

b ₃	b ₄	c ₁	e ₃ ² (8 Stages)	f ₁	g ₅	g ₆	h ₃	m ₃	m ₄	n ₃	n ₄	o ₁	s ₁	s ₂
590	90	70	1020	660	19	45	345	90	90	80	150	50	28	18

Table of dimensions



Dimensions in mm

Type	Axial thrust balancing	Bearing type	Pump dimensions					Shaft end						Pump dimensions					max. no. of stages				
			DN ₁	DN ₂	h ₁	h _p	h ₂	d	u	t ₁	t ₂	l	d _d	t _{d1}	t _{d2}	g ₁	g ₂	i ₁		i ₂	i ₁ ²	l _{st}	
HKGB 15000	Balance disc, or disc/drum combination	B	200	150	305	305	460	56	12	58.1	60.2	170	46	48.1	50.2	570	555	440	385	(8 Stages)	1085	120	11
		S																					
		C																					
		R																					
		1;2																					
T; U	65	12	67.1	69.2	55	57.1	59.2	595	580	425	424	571											

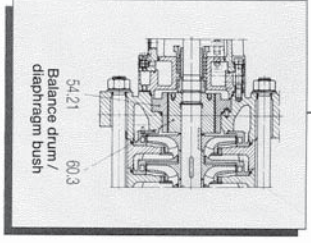
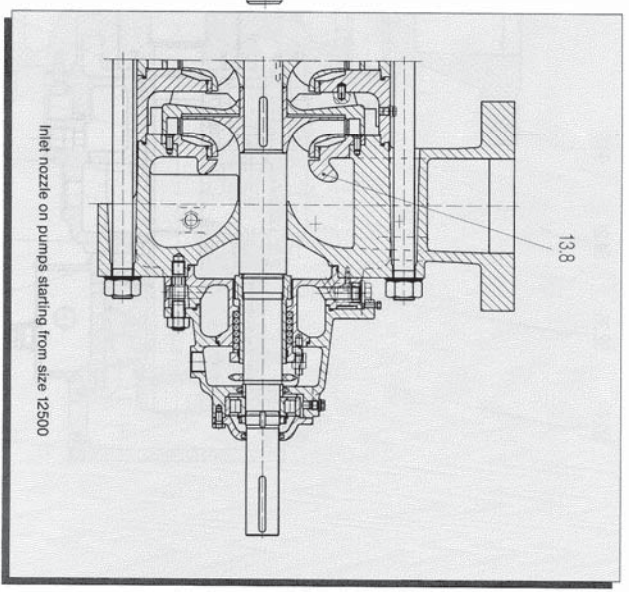
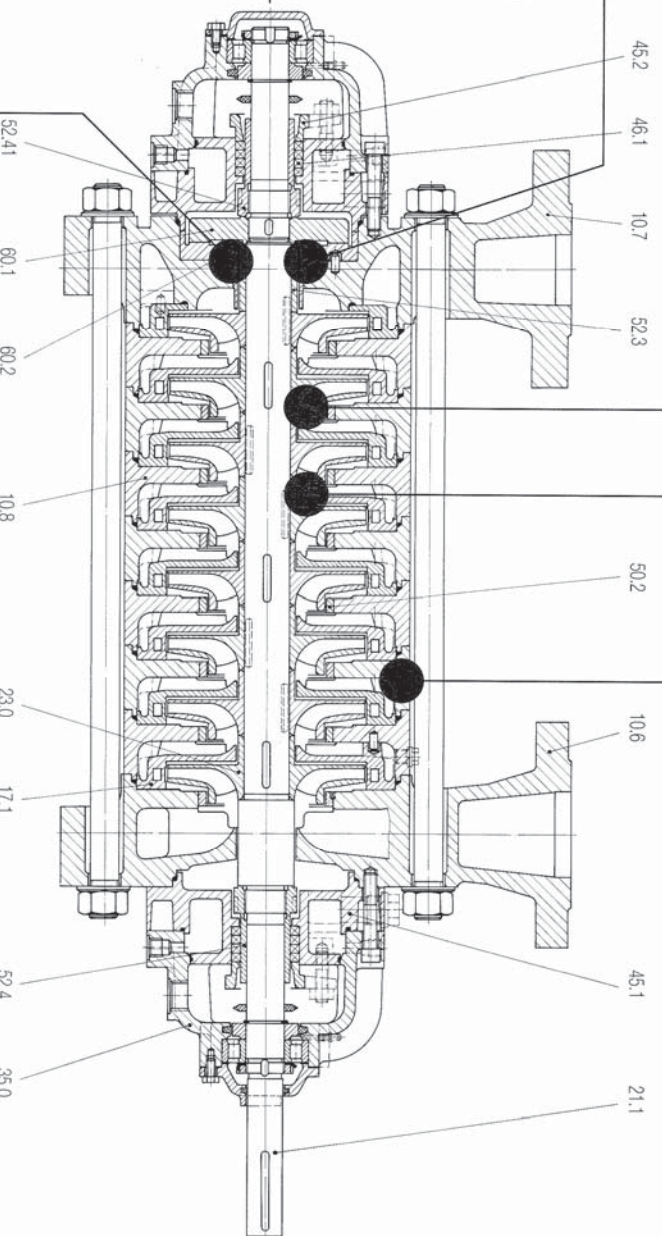
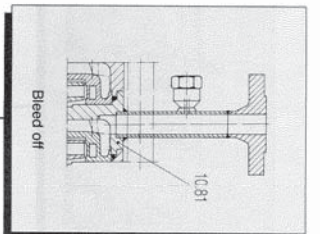
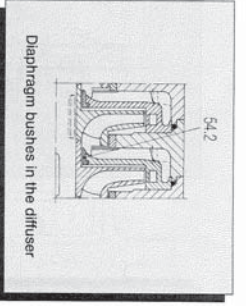
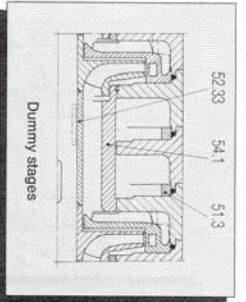
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 U = sleeve bearing, force feed oiled, with lift-off device

²⁾ For a different number of stages, alter the dimensions by the difference in stage number x dimension l_{st}

b	b ₁	b ₂	c	e ₂ ²⁾	e ₁	e ₂	f	g ₃	g ₄	m ₁	m ₂	n	n ₁	o _S	o _D	s
480	30	30	22	1309	40	24	540	50	50	80	80	95	75	125	115	22

b ₃	b ₄	c ₁	e ₃ ²⁾	f ₁	g ₅	g ₆	h ₃	m ₃	m ₄	n ₃	n ₄	o ₁	s ₁	s ₂
670	90	80	1175	740	34	50	385	90	90	80	150	50	28	18



- 10.6 Suction casing
- 10.7 Discharge casing
- 10.8 Stage casing
- 10.81 Stage casing with bleed off
- 13.8 Inlet nozzle
- 16.5 Cooling cover
- 17.1 Diffuser
- 21.1 Shaft
- 23.0 Impeller
- 32.1 Radial ball bearing

- 35.0 Bearing housing
- 35.1 Bearing housing - lower part
- 35.2 Bearing housing - upper part
- 35.4 Thrust bearing housing
- 37.01 Bearing shell
- 38.2 Bearing carrier
- 42.1 Radial shaft seal ring
- 42.31 Labyrinth housing
- 45.1 Stuffing box housing
- 45.2 Stuffing box gland

- 46.1 Stuffing box packing
- 50.2 Case wear ring
- 51.3 Insert sleeve
- 52.3 Shaft sleeve
- 52.33 Shaft sleeve
- 52.4 Shaft protection sleeve
- 52.41 Shaft protection sleeve
- 54.1 Dummy bush
- 54.2 Diaphragm bush
- 54.21 Throttling bush

- 60.1 Balance disc
- 60.2 Balance disc seat
- 60.3 Balance drum
- 62.1 Indicator pin
- 62.4 Oil level sight glass
- 64.4 Oil ring
- 64.9 Oil retaining disc
- 67.2 Vent
- 95.0 Spring