

SEZ	N 9-70 / 1	Date	14.08.2025
DS [mm]	700	Project Number	4005826330
QTY	1	Project Name	Termoelectrica - Republic of Mo
Load	1 x 100%	Customer	I
nq	95	Rev	0

Operating Data		Design	
Medium	River water	Mounting Arrangement	EJ
Fluid Temperature [C]	20	No. Of Stages	1
Density [kg/m³]	998	Direction of rotation from drive	Clockwise (viewed from above)
Flow [m³/h]	9360	Discharge Elbow Diameter [mm]	900
Discharge Head [m]	13,5	Discharge Nominal pressure	PN 6
Efficiency [%]	83,59	Disc. Elbow Flange holes	DIN EN 1092 - 1
Power absorbed [kW]	412,96	Disc. Elbow Flange thickness	DIN EN 1092 - 1, PN6
Pump speed of rotation [1/min]	594	Thrust bearing	KSB Standard
NPSHR3% [m]	6,42	Thrust bearing cooler	KSB Standard
Hv ESK losses [m]	0,65	Shaft Seal	Gland Packing
Head at zero flow [m]	31	Reverse rotation lock	No
Min. Flow [m³/h]	6726,31	Flood Proof Arrangement	No
Max. Flow [m³/h]	11518,22	Pull Out Type	No
Driver, accessories		Test Pressure [bar]	4,03
Driver Type	Electric motor, direct	Impeller diameter max [mm]	924
Designed for VFD Operation	No	Impeller diameter rated [mm]	853,39
Motor speed [1/min]	594	Radial Bearing Impeller	Thordon Bearings
Frequenzy [Hz]	50	Radial Bearing Other	Thordon Bearings
Voltage [V]	6000	Intake Chamber Typ preferred	Intake Chamber Typ 2.2
Drive Rating [kW]	467	Motor Coupling	KTR Radex (all-steel coupling) or equal
Material Combination		Painting Spec.	
Material Combination	10	Surface in Contact with medium	
Part Designation	Material	Pre Treatment	Sand Blasting SA 2,5 acc. DIN EN ISO 12944-4
Bellmouth	S235JR or A283 GR B	Primer	2-component epoxy zinc dust, thickness = 50 µm, Product = SikaCor Zinc R
Discharge Elbow	S235JR + 1.4404 or A283 GR B + SA240(M) Type 316L	Top Coat	2-component epoxy resin, 1 x 150 µm black 1 x 150 µm tinted red, 1x 150 µm black, Product = Sika Poxicolor SW New
Diffusor	S235JR + 1.4404 or A283 GR B + SA240(M) Type 316L	Surface not in contact with medium	
Inlet Cone	S235JR or A283 GR B	Pre Treatment	Sand Blasting SA 2,5 acc. DIN EN ISO 12944-4
Shafts	C45+N or A576 GR 1045	Primer	2-component epoxy zinc dust, thickness = 50 µm, Product = SikaCor Zinc R
Impeller	1.4409 or A743 GR CF-3M	Intermediate Coat	2-component epoxy resin, 2 x 80 µm, Product = SikaCor EG1
Drive Lantern	S235JR or A283 GR B	Top Coat	2-Component polyurethane (PUR), 1 x 60 µm, RAL 5002 Ultramarine blue, Product = SikaCor EG5
Wear Ring	1.4404 or SA240(M) Type 316L	Tests	
Column Pipe	S235JR or A283 GR B	QCP acc. To	See QCP Information
Disc Coupling	P250GH or A105	Hydraulic Test (Non Witness)	ISO 9906 Class 1B
Base Frame	S235JR or A283 GR B	Submerge Test	No
Impeller Nut	1.4462 or A473 Type S32950	NPSH Test (5 Points)	No
Scope of Supply		Hydraulic Test (Witness) Qty:	No
Drive	No	Motor Engine for Tests	Test Bed Motor with reduced speed
Spacer Sleeve	No		
Venting Valve	No		
Other			

Mounting Arrangement



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Drawing Nr.

4005826330 -2

ET	2840	mm
H1	2500	mm
H2	560	mm
H3	900	mm
H4	4500	mm
L3	900	mm
D1	1400	mm
D3	900	mm

Motor Level 4,5 m

Floor Level 0 m

NPSHA m

Max Waterlevel m

NPSHA m

Mid. Waterlevel m

Necessary Waterlevel -1,244 m

NPSHA 11,26 m

Min. Waterlevel -1,2 m

NPSH Reference level -2,49 m

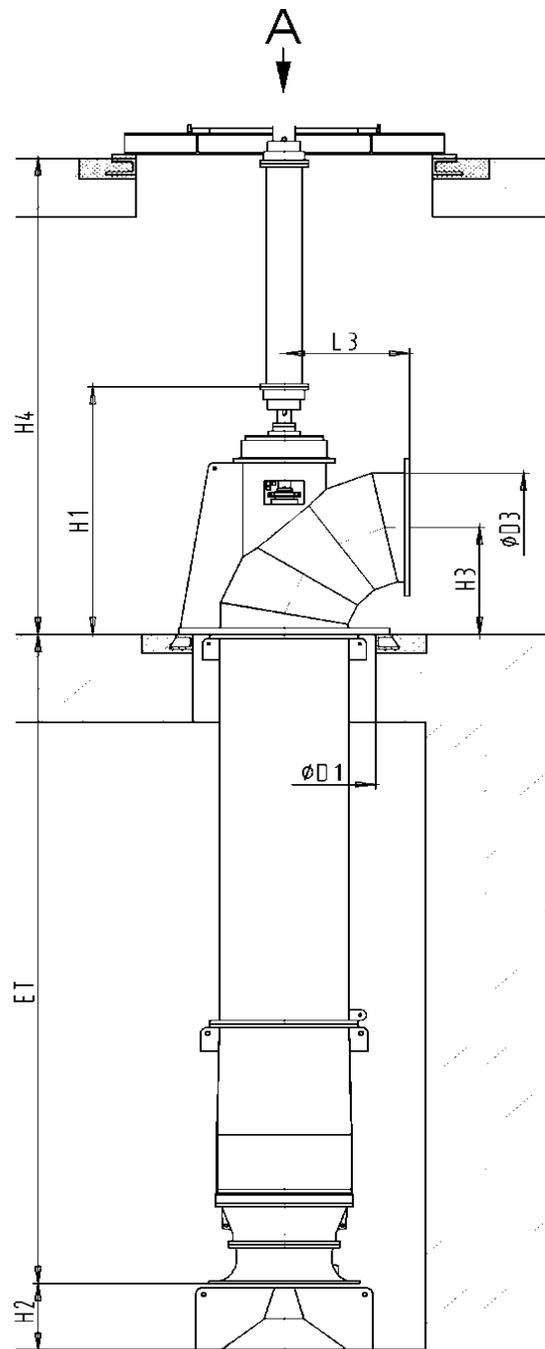
Inlet of Pump -2,84 m

Ground Level -3,4 m

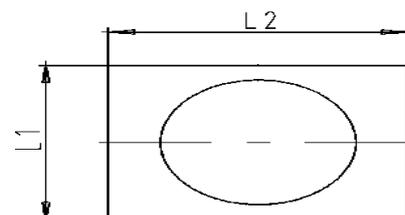
Pump Weight [kg] 6600 kg

Water Column [kg] 1048 kg

Motor Weight [kg] 7000 kg



Ansicht A



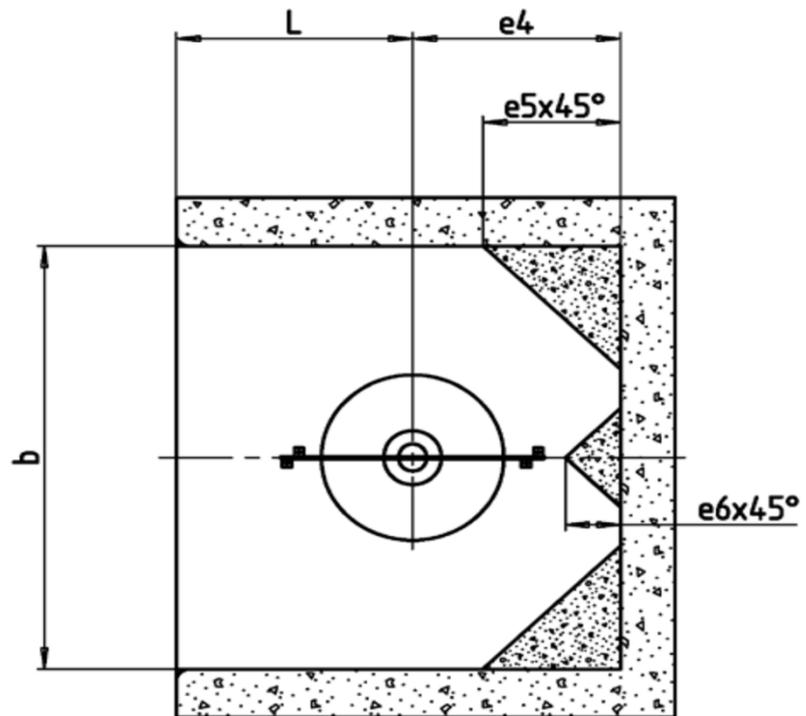
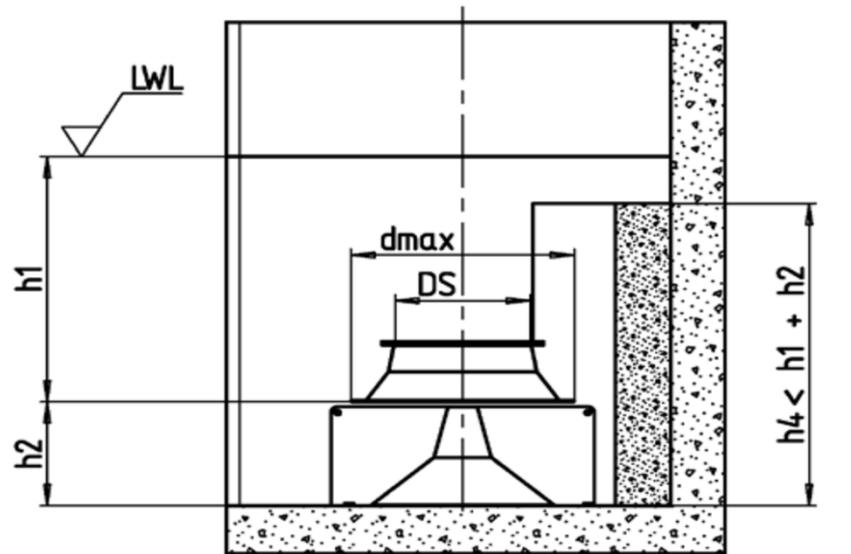
Intake Chamber Type 2.2



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h1	1596	mm
h2	560	mm
Lmin	1150	mm
b	2300	mm
e4	1010	mm
e5	670	mm
e6	270	mm
dmax	1360	mm



Sectional Drawing

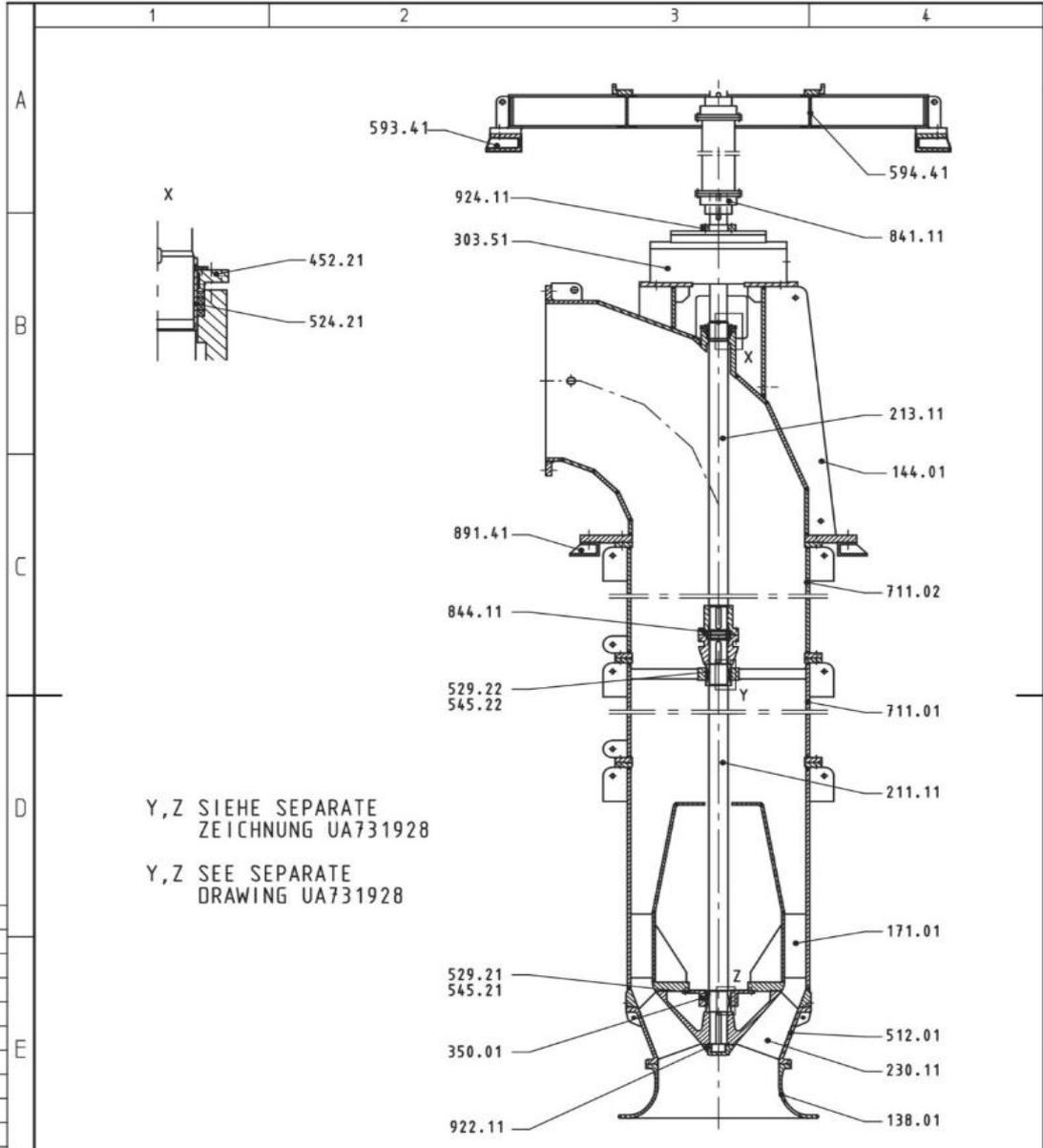


SEZ

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Doc. Nr.

4005826330 -3



Y,Z SIEHE SEPARATE ZEICHNUNG UA731928
 Y,Z SEE SEPARATE DRAWING UA731928

100
50
0

GEPR. APPROVED	2000-09-28	LUTZ
BEARB. PREPARED	2000-09-25	GUTPERLE
ÄNDERUNG, INDEX/ANZ. ALTERATION: INDEX/NO	03/ÜARB	
NORM STANDARD	1997-04-21	NECKERAUER
GEPR. APPROVED	1997-04-21	P. HARTMANN
BEARB. PREPARED	1997-04-21	SACHSE
DATUM DATE		NAME



BENENNUNG/DENOMINATION GESAMTZEICHNUNG GENERAL DRAWING		TEILE-NR. PART-NO 97-2
NR./NO UA72778301		BLATT-NR. SHEET-NO 1
SCHUTZVERMERK DIN 34-1-D COPYRIGHT ACCORDING TO DIN 34-1-E		VON/OF
ERS. FÜR/REPLACES	ENTST. AUS/ORIGINAT. FROM	

2

Sectional Drawing



SEZ

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Doc. Nr.

4005826330 -4

Part No.	Part	Material
138	Bellmouth	A283 GR.B or S235JR
144	Discharge Elbow	A283 GR.B + SA240 (M)Type 316L or S235JR + 1.4404
171	Diffuser	A283 GR.B + SA240 (M)Type 316L or S235JR + 1.4404
211	Pump Shaft	A576 GR 1045 or C45+N
213	Top Shaft	A576 GR 1045 or C45+N
230	Impeller	A743 GR CF-3M or 1.4409
303	Thrust and Radial Bearing	KSB, Turbolink, Michell, Renk
350	Bearing Housing	A105 or P250GH
452	Gland	KSB Standard
512	Wear Ring	SA240 (M)Type 316L or 1.4404
524	Shaft Protecting Sleeve	A743 GR CC-50 or 1.4138
529	Bearing Sleeve	A743 GR CC-50 or 1.4138
545	Bearing Bush	Thordon Bearings
593	Rail	A283 GR B or S235JR
594	Support Frame	A283 GR B or S235JR
711	Column Pipe	A283 GR B or S235JR
841	Drive Coupling	KTR Radex (all-steel coupling) or equal
844	Disc Coupling, Rigid	A105 or P250GH
891	Baseplate	A283 GR B or S235JR
922	Impeller Nut	A473 Type S32950 or 1.4462
924	Adjusting Nut	A473 Type 431 Condition T or 1.4057+QT800

ZULASSIGE DRUCKSTUTZENKRAFTE UND MOMENTE

DIE TABELLE ZEIGT DIE ZULASSIGEN STUTZENKRAFTE UND MOMENTE FÜR GLEICHZEITIGE BELASTUNG IN DEN DREI EBENEN, GÜLTIG FÜR EB-, EJ- UND EM-AUFSTELLUNG.

AUF KRÜMMER IN CD-AUFSTELLUNG DÜRFEN GRUNDSÄTZLICH KEINE ÄUßEREN KRAFTE UND MOMENTE WIRKEN ($F_1 = 0, M_1 = 0$).

DIE ANGEGEBENEN KRAFTE UND MOMENTE GELTEN FÜR GLEICHZEITIGE BELASTUNG IN DREI EBENEN.

DIE SUMME DER AUFTRETENDEN KRAFTE UND MOMENTE, Z.B. RESULTIEREND AUS DRUCK- UND TEMPERATURDEHNUNGEN DER ROHRLEITUNGSKOMPONENTEN SOWIE DER GEWICHTSKRÄFTE, DIE AXIALE KRAFT F_p UND DIE REAKTIONSKRAFT F_R DÜRFEN DIE MAXIMAL ZULASSIGEN KRAFTE (F_x, F_y, F_z) UND MOMENTE (M_x, M_y, M_z) AM DRUCKSTUTZEN NICHT ÜBERSCHREITEN. DIES IST VOM ANLAGENPLANER / KSB-VERTRAGSPARTNER SICHERZUSTELLEN.

KRÄFTE UND MOMENTE, DIE ÜBER DIE GRENZWERTE HINAUSGEHEN, SIND DURCH GEEIGNETE MASSNAHMEN AN DER DRUCKLEITUNG AUFZUFANGEN.

BEI GEGEBENER STEIFIGKEIT DES AUSLAUFKRÜMMERS VERSCHIEBT SICH DER DRUCKSTUTZEN UNTER DER MAXIMAL ZULASSIGEN AXIALKRAFT F_y UM 0,3 mm. EINE GRÖßERE VERSCHIEBUNG IST UNZULÄSSIG.

DIE AXIALE KRAFT F_p , DIE DURCH INNENDRUCK IM AUSLAUFKRÜMMER ENTSTEHT, UND DIE REAKTIONSKRAFT F_R AUS DER STROMUNGSUMLENKUNG IM AUSLAUFKRÜMMER, MÜSSEN VON DER DRUCKLEITUNG UND DÜRFEN NICHT VON DER PUMPE AUFGENOMMEN WERDEN.

PERMISSIBLE DISCHARGE NOZZLE FORCES AND MOMENTS

THE TABLE LISTS THE MAXIMUM ALLOWABLE FORCES AND MOMENTS ON THE NOZZLE ACTING SIMULTANEOUSLY IN ALL THREE PLANES. VALID FOR EB- EJ- AND EM-ARRANGEMENT.

AS A RULE, THERE SHALL NOT BE ANY EXTERIOR FORCES OR MOMENTS ACTING ON THE CD-ELBOW ($F_1 = 0, M_1 = 0$)

THE INDICATED FORCES AND MOMENTS ARE FOR SIMULTANEOUS LOADING IN THE THREE PLANES

THE TOTAL OF THE FORCES AND MOMENTS GENERATED, E.G. RESULTING FROM PRESSURE AND TEMPERATURE-INDUCED EXPANSIONS OF THE PIPING COMPONENTS AS WELL AS THE FORCE DUE TO WEIGHT, THE AXIAL FORCE F_p AND THE REACTIVE FORCE F_R , MUST NOT EXCEED THE MAXIMUM PERMISSIBLE FORCES (F_x, F_y, F_z) AND MOMENTS (M_x, M_y, M_z) AT THE DISCHARGE NOZZLE. THIS HAS TO BE ENSURED BY THE PLANT ENGINEERING CONSULTANT / KSB'S CONTRACTUAL PARTNER.

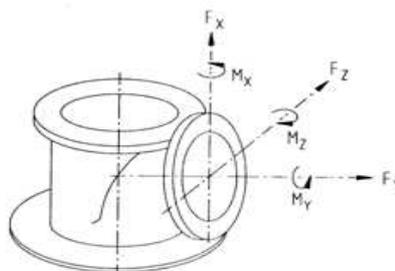
ANY FORCES AND MOMENTS EXCEEDING THE LIMIT VALUES SHALL BE ABSORBED BY APPROPRIATE MEASURES ON THE DISCHARGE PIPE.

AT A GIVEN STIFFNESS OF THE DISCHARGE ELBOW THE DISCHARGE NOZZLE SHIFTS BY 0.3 mm UNDER THE MAXIMUM PERMISSIBLE AXIAL FORCE F_y . A LARGER DISPLACEMENT IS IMPERMISSIBLE.

THE AXIAL FORCE F_p GENERATED BY THE INTERNAL PRESSURE IN THE DISCHARGE ELBOW AND THE REACTIVE FORCE F_R RESULTING FROM THE FLOW DEFLECTION IN THE DISCHARGE ELBOW MUST BE ABSORBED BY THE DISCHARGE PIPE; THEY MUST NOT BE ABSORBED BY THE PUMP.

DN	F_i [N]	M_i [Nm]
700	14000	2800
800	17800	3550
900	23100	4550
1000	29000	5600
1100	34800	6750
1200	41850	7850
1300	48900	9100
1400	56000	10300
1500	64000	11800
1600	71000	13300
1800	88000	16300
2000	106450	19350
2200	124300	22250
2400	143400	25350

$F_1 = F_x = F_y = F_z$
 $M_1 = M_x = M_y = M_z$



KOORDINATENSYSTEM
 SYSTEM OF CO-ORDINATES

Nozzle Forces



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Maximum Allowable Forces and Moments on the Nozzle

Nozzle Forces Fx, Fy, Fz [N]	23100
Nozzle Moments Mx, My, Mz [Nm]	4550

Project specific Forces must be absorbed by the discharge Pipe

Fp generated by the pressure [N]	193080
Fr resulting from the flow deflection [N]	16060

Sum of Forces that has to be absorbed by the discharge Pipe: **209140** N

Only necessary for EB,EM and EJ installation Type:

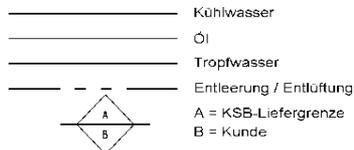
KSB propose to use a fix point behind the Pump to absorb the project specific forces, otherwise it can lead to damages of the pump. Some examples are*:

	<p>Two expansion joints</p>
	<p>Wall anchorage point with expansion joint</p>
	<p>Anchorage point without expansion joint</p>

* Ask KSB for further Information if necessary

LEGENDE

Symbole nach DIN 2429



Lieferumfang:
 Zum KSB-Lieferumfang gehören nur die örtlichen Instrumente. Bei Instrumenten zur Fernüberwachung liefert KSB das Gebergerät, einen lokalen Klemmenkasten und die Verkabelung zwischen Gebergerät und Klemmenkasten

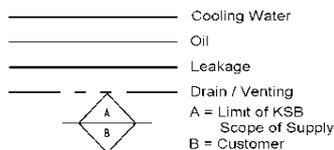
KKS - System Pumpenanlage:

PACX0 = Hauptkühlwassersystem
 PGBX0 = Kühlwassersystem
 PAVX0 = Ölversorgungslösungen

X = 1 für Pumpe 1
 X = 2 für Pumpe 2
 X = 3 für Pumpe 3

LEGEND

Symbols acc. to DIN 2429

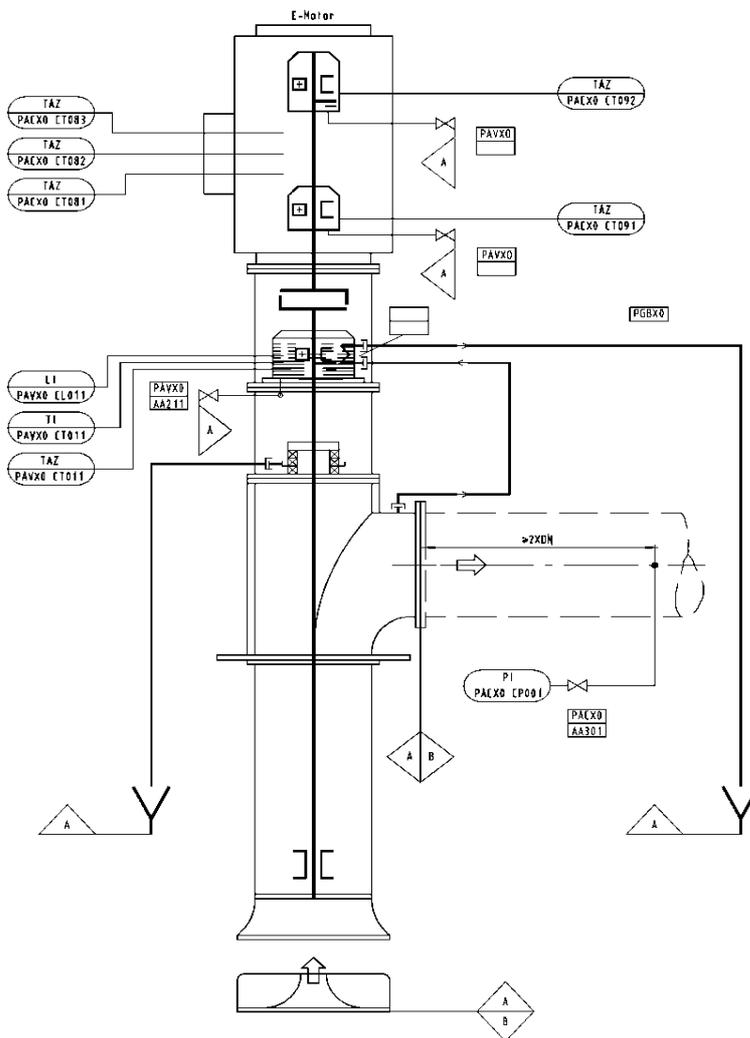


Scope of supply:
 KSB's scope of supply is limited to local instruments. In the case of instruments to allow remote monitoring their transducer, local terminal box and cabling between them will be supplied by KSB.

KKS - System Pumping Set:

PACX0 = Main Cooling Water System
 PGBX0 = Cooling Water System
 PAVX0 = Oil System

X = 1 for pump 1
 X = 2 for pump 2
 X = 3 for pump 3



Nur für Angebot / Anfrage
 Technische Änderungen vorbehalten

For Offer / Inquiry Only
 Technical Modifications Reserved

Zugehöriges Messstellenverzeichnis: M
 Zugehöriges Armaturenverzeichnis: A

Reference List Of Measuring Points: M
 Reference List Of Valves: A

*The PuID can show instruments that are not scope of supply for this offer therefore please note the Instrumentation list attached to this offer

Technical Curves

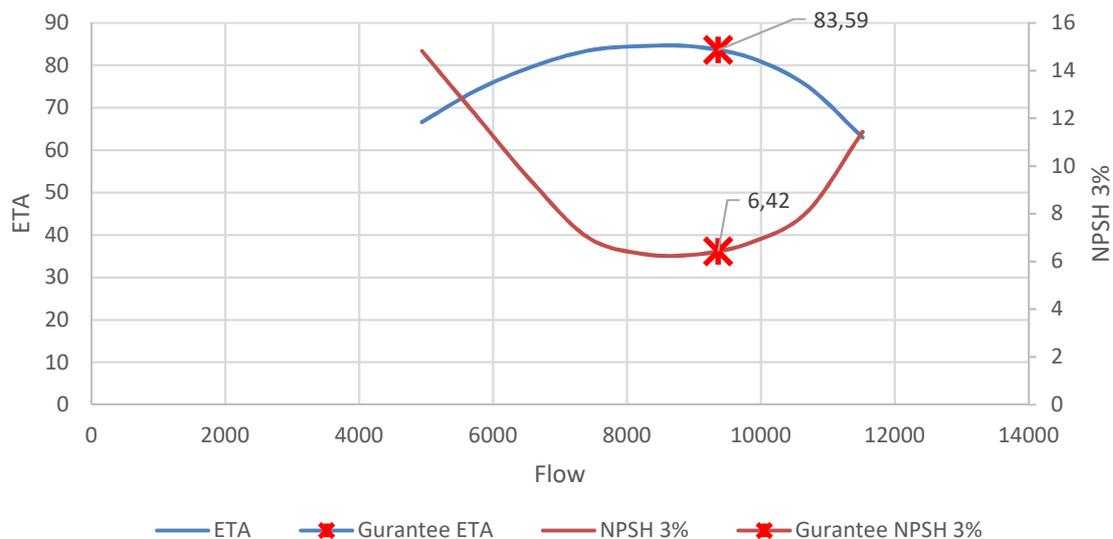
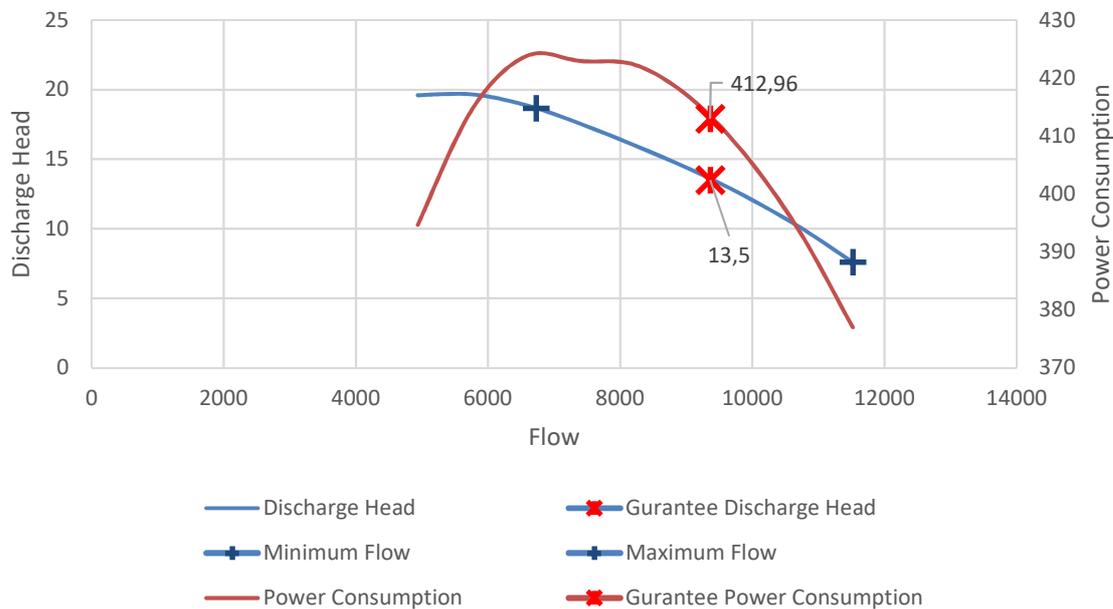


SEZ

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4005826330 -8



Units

Flow	m ³ /h	NPSH3%	m
D. Head	m	Power C.	kW

*Operating only allowed > Qmin

Curve	Impeller Diameter [mm]
1	853,39

Speed [1/min]	594
Temperature [C]	20
Density [kg/m ³]	998

Technical Curves



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Operation is only allowed between Min. Flow and Max. Flow.

NPSHA values can limit the operating range of the pump.

Nomination	Zero Capacity	Min. Flow	Guarantee Point	Max. Flow	Run Out	Max. Power
Q [m3/h]	0	6726,31	9360	11518,22		6726,31
H [m]	30,74	18,67	13,5	7,59		18,67
Eta [%]	0	80,52	83,59	62,99		80,52
P [kW]	499,24	423,97	412,96	376,97		423,97
Speed [1/min]	594	594	594	594		594
NPSH [m]	31,28	8,85	6,42	11,44		8,85

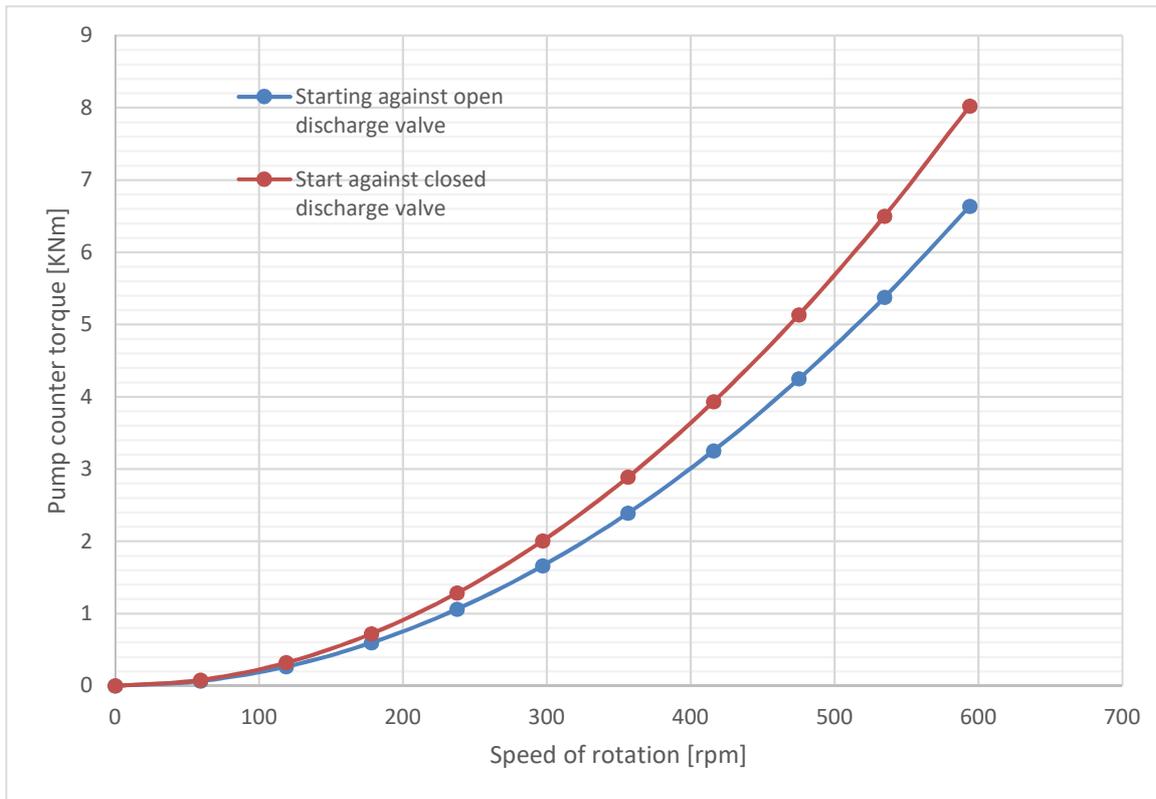
Start - Up Curve



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Q [m ³ /h]	H [m]	ETA [%]	P ₀ [kW]*	P _N [kW]**	n _N [rpm]
9360	13,5	83,59	499,24	412,96	594



Mass moment of inertia	35 kg*m ²
Weight of rotating parts	700 kg

Information about Thrust Bearing

Thrust Bearing has to be in the motor: No

Maximal axial thrust for continuous operation: 107000 N

Maximal axial thrust upwards (short operation) 10700 N

Radial Force 10700 N

Maximum Torque by starting against closed discharge valve*** 8,026 KNm

Maximum Torque by starting against open discharge valve 6,639 KNm

* Power at zero flow

** Power at nominal flow

***KSB SEZ Pumps are only allowed to start up against open valve or gradually opening valve. Start up against closed valve only on request.

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Doc. Nr.	4005826330 -10
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Material Tests

Nr.	Component	Chemical Analysis	Tensile Test at RT	Impact Test at RT	Aloy Verification Test	Dimensional Examination	Visual Examination	Marking Check	Balancing
144	Discharge Elbow	2.1/M							
171	Diffuser	2.1/M							
211 / 213	Shafts	3.1/M	3.1/M	3.1/M	3.1/M	3.1/M	3.1/M	3.1/M	
230	Impeller	3.1/M	3.1/M		3.1/M	3.1/M	3.1/M	3.1/M	3.1/H
512	Wear Ring	3.1/M	3.1/M		3.1/M	3.1/M	3.1/M	3.1/M	
711	Column Pipe	2.1/M							

Certification

Balancing according acc. ISO 1940 G6.3	3.1/H
Pressure Test acc. DIN EN 12162 (30 Minutes)	3.1/H
Performance Test	KSB Report
Final Inspection and Marking Check	3.1/H

*For more or detailed Information about possible certificates feel free to contact us

M = Material Manufacturer
H = Pump Manufacturer

Instrumentation List



SEZ

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Doc. Nr.

4005826330 -11

*Pump**

Nr	Description	Standardtype	Included
1	Thrust Bearing		
1.1	Local oil level indicator	Acc. Thrust bearing manuf.	x
1.2	local thermometer for oil temperature	Acc. Thrust bearing manuf.	
1.3	1 x PT 100 element 3 wire dual type for oil temperature	KSB Standard	x
1.4	1 x PT 100 element 3 wire dual type for rolling element or rather main thrust pad	KSB Standard	
1.5	1 x PT 100 element 3 wire dual type for journal thrust pad	KSB Standard	
1.6	Redundant design for PT 100 elements		
1.7	preparation for oscilation pick up device / vibration sensors	Standard is two M8 threads at the bearing housing	
1.8	Oil heater if necessary and applicable	Acc. Thrust bearing manuf.	x
2	Oscilation pick up device		
2.1	Oscilation pick up devive with two sensors for x and y direction	KSB Standard (Prueftechnik Vibrex)	
3	Others		
3.1	Local pressure measuring (pressure gauge)	KSB Standard	x
3.2	Pressure sensor located at the discharge elbow	KSB Standard	
3.3	Sensor for rpm and rotation direction	KSB Standard	
4	Junction Box / Terminal Box		
4.1	Junction Box where all instruments are prewired with transmitters (4-20 mA Output)	KSB Standard	

Motor Engine Standard (Additions at request)

Nr	Description	Standardtype
1	Two PT 100 elements per motor phase	acc. Engine Supplier
2	One PT 100 element at the guide bearing	acc. Engine Supplier
2	Standstillheater (If necessary)	acc. Engine Supplier

*For special instrumentation requests feel free to contact us

Vendor List



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Nr.	Part Description	Vendor
1	Thrust Bearing	Turbolink, Michell, Renk, KSB
2	Coupling	KTR, Siemens
3	Motor Engine	ABB, Siemens, Teco, HHI, Hyosung, Schorch, WEG
4	Radial Bearings	KSB, Thordon Bearings
5	Material Sourcing	Global Material sourcing acc. to KSB quality without limitation

Documentation List



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Doc. Nr. 4005826330 -13

	Included (1.1)	Document Delivery	Penalty Doc. (1.3)	Hold for Approval (1.4)	QTY	Incl. in IOM Manual
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Drawings

Outline drawing including allowable forces and moments	Yes	8	WAO	NO	NO	E	YES
Cross sectional drawing (including bill of materials)	Yes	8	WAO	NO	NO	E	YES
Performance test plan	Yes	8	WAO	NO	NO	E	NO
Motor catalogue drawing	If applicable	10	WAO	NO	NO	E	YES
Motor wiring / connection diagram (1.5)	If applicable	10	WAO	NO	NO	E	YES
Coupling outline drawing (incl. bill of materials) (1.5)	If applicable	14	WAO	NO	NO	E	YES
Thrust Bearing outline drawing (incl. bill of materials) (1.5)	If applicable	14	WAO	NO	NO	E	YES

Documents

Predicted performance curve	Yes	6	WAO	NO	NO	E	NO
Spare parts list	Yes	In IOM	In IOM	NO	NO	In IOM	YES

Test results and NDE

Certified pump performance test data	If applicable	1	WAT	NO	NO	E	YES
Certified hydro test (If included in scope of supply)	If applicable	In IOM	In IOM	NO	NO	In IOM	YES
Motor test report (If included in scope of supply)	If applicable	In IOM	In IOM	NO	NO	In IOM	YES

Final manuals

IOM Manual	Yes	2	WAD	NO	NO	E for approval 2H + 1CD final	NO
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IOM Installation, Operation & Maintenance Manual
 WAD Weeks after Delivery
 WAO Weeks after receipt of acceptable purchase order
 WAT Weeks after test
 ARAD After Receipt of approved drawings
 ARO After Receipt of order
 E Electronic
 CD Compact Disc
 H Hard Copy

Notes:
 1.0 The note "if applicable" means that the specific item was sold with the feature
 1.1 All formats will be in KSB / Vendor Standard format
 1.2 Binder and paper size for standard packages are DIN A4
 1.3 If agreed during commercial negotiations
 1.4 If agreed during commercial negotiations
 If any documents are selected "YES" then the pump delivery time quoted must be ARAD
 If all documents are selected "NO" then the pump delivery time can be quoted ARO
 1.5 Or promised delivery time of certified sub vendor document + 4 weeks, whichever is longer
 1.6 4 WAO then every 4 weeks

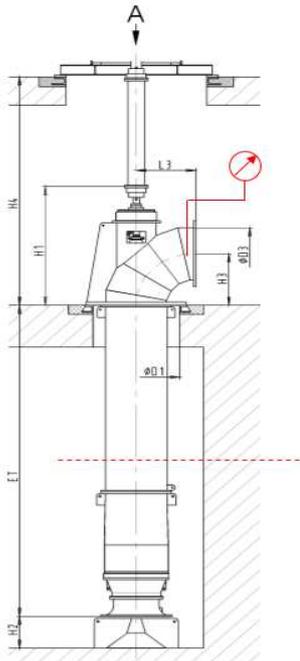
Adders:
 * Extra hard copy for non API is 70 €, for API is 180 €
 * Extra CD 25 €
 * For Customer own format documents add 55 €
 * All packages to be supplied in one binder, if differen add 20 € per extra binder
 * KSB will submit documents 1 time, and 1 re-submittal is free of charge, each additional resubmittal will be charged with 325 €
 * For any additional documents not listed above contact KSB for price adders

Pump Pressure Information



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Doc. Nr. 4005826330 -14



Level Pressure Gauge	0,9 m
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Minimum Waterlevel	-1,2 m
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Density of the medium	998	kg/m ³
Gravity	9,81	ft/s ²
Leveldifference	2,1	m
Normal flow rate	9360	m ³ /h
Diameter discharge port	0,9	m
velocity at the discharge port	4,087	m/s
Pressure losses due to velocity	0,852	m

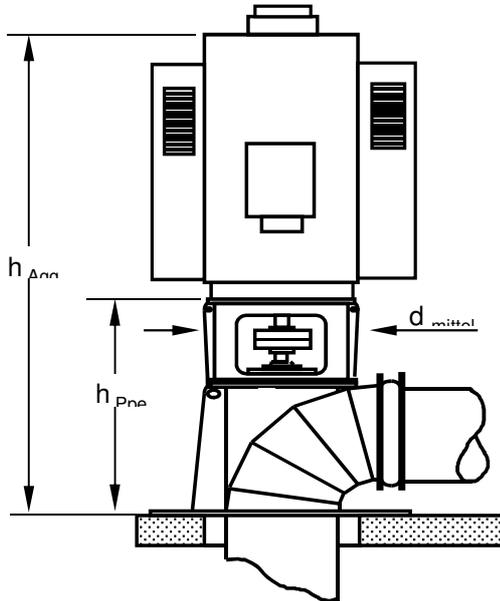
Normal head of the pump	13,5 m
Display pressure gauge	10,55 m
	1,032689282 bar

SEZ N 9-70 / 1

Doc. Nr.

4005826330 -15

Acoustic values of the pump (without motor engine)



P Pump [kW]	412,96
Speed n [1/min]	594
h Ppe [m]	2,5
d m [m]	1,5

Sound pressure level LpA [dB]

80,12

Envelop. surface dimension Ls [dB]

17,9

Sound power LWA [dB]

98,02

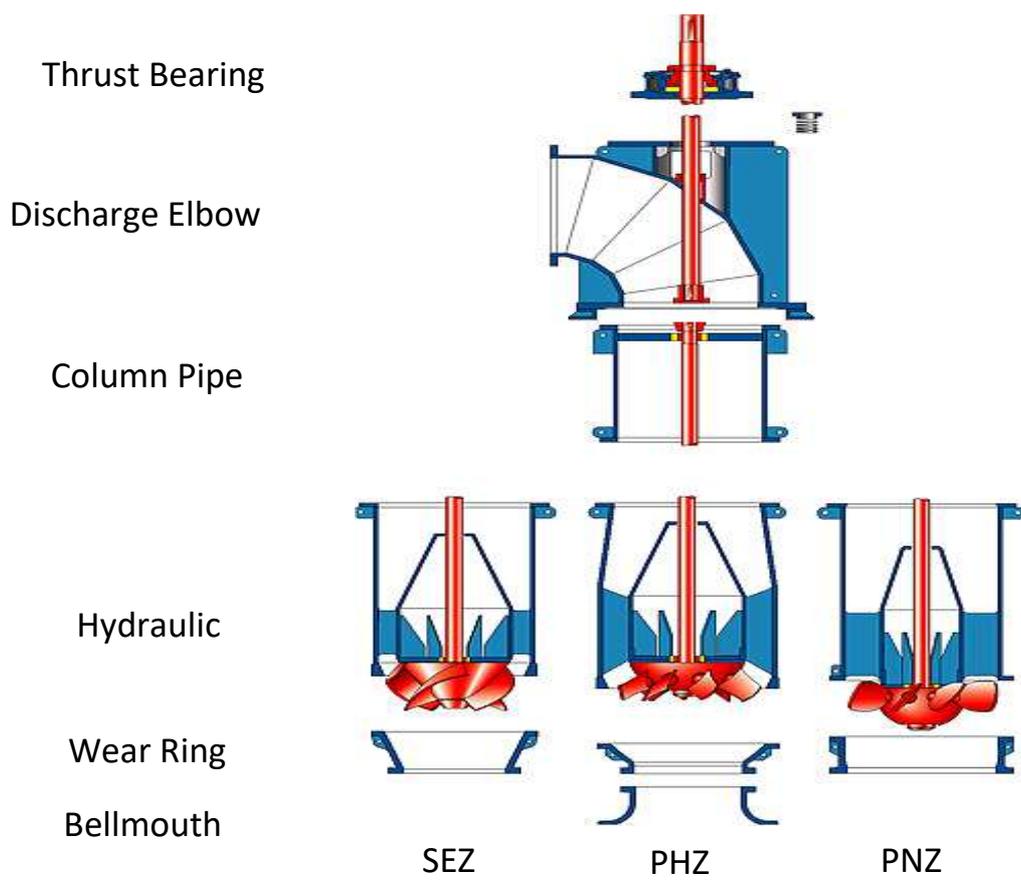
Octave spectrum fm [Hz]	Lp [dB]
63	74,12
125	76,12
250	80,12
500	78,12
1000	76,12
2000	72,12
4000	64,12
8000	68,12

To lower the noise level a noise absorption hood can be delivered by KSB (Cost increaser)

1. Pump type

For Your requirement, we have planned the following pump type with positive proven results and tested over a long time:

Vertical tubular casing pump, type "SEZ", with mixed flow hydraulic and horizontal discharge elbow. The pump's other main components are impeller, diffuser, pump, shaft, shaft bearings and column pipes.

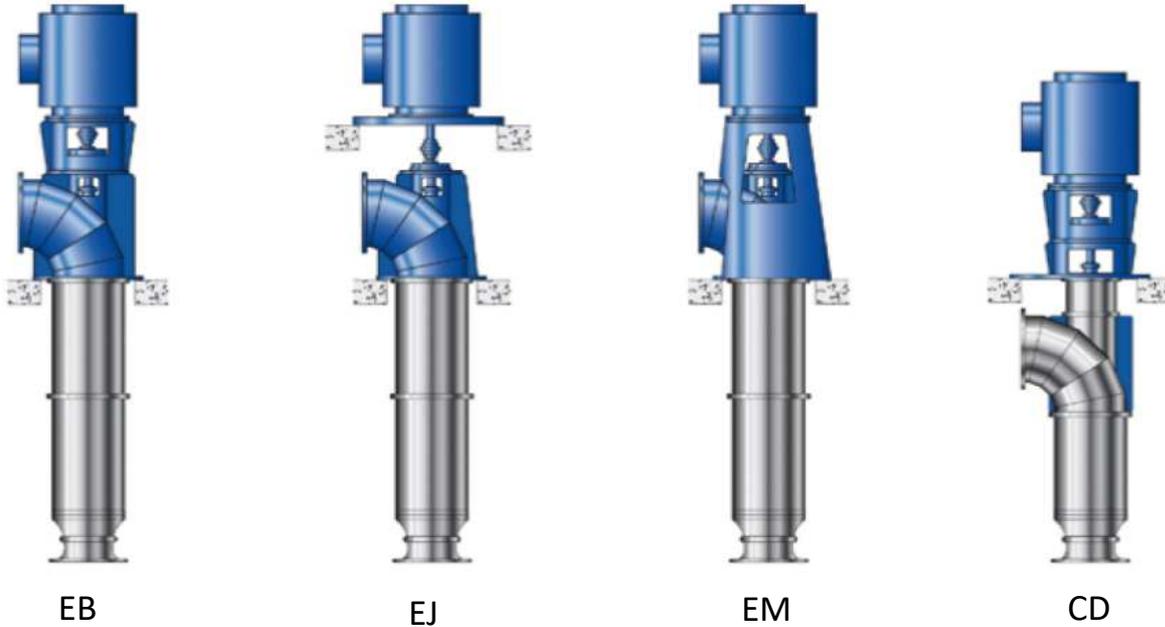


2. Hydraulic data and material selection

The data concerning Q and H and material selection of the pump offered are based on the requirements specified in Your inquiry and have been entered in the attached data sheet. Please also note the attached pump pressure information attached to these offer.

3. Type of installation

The type of installation is "EJ", this means the discharge nozzle is arranged above floor. The pump is suspended beneath the discharge elbow and above floor. The drive is mounted on a second floor.



4. Impeller design: open mixed flow impeller

The hydraulic system of the offered pump type is based on the required operating data and results in an open mixed flow impeller with multiply curved blades.

The impeller runs in a wear ring, the required clearance can be adjusted by lifting and lowering the impeller.

The impeller is balanced at the manufacturer's works to achieve smooth running.

5. Number of stages

Based on the operating data specified, we have selected a single-stage hydraulic system.

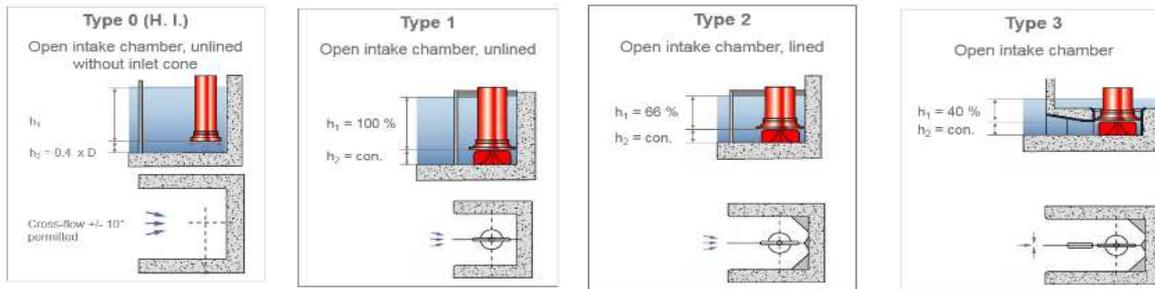
6. Intake chamber

For inflow, an open intake chamber has been specified. This is a type with special additional fittings (Not in KSB Standard Scope- but can be offered). The pump immersion depth selected ensures

operation without air-entraining vortices and cavitation.

If required, an entry cone will be installed (In KSB Scope).

KSB's preselected dimensions are given in annex "Intake Chamber".



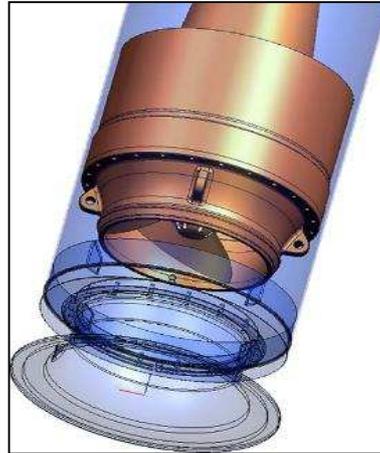
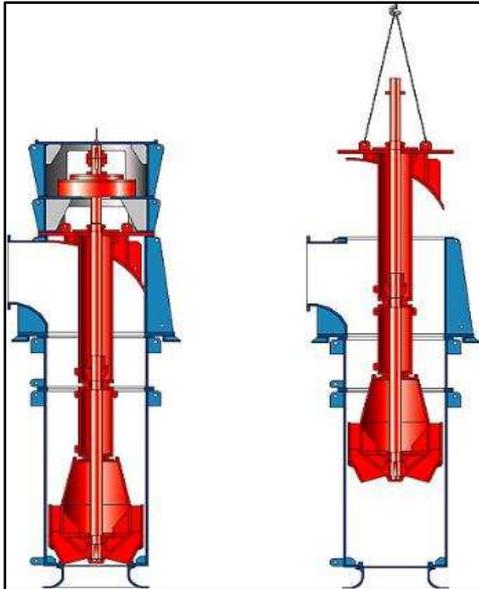
7. Entry cone

In order to ensure a smooth pump operation, a uniform inflow is an absolute requirement. Therefore, an entry cone will be arranged underneath the inlet nozzle of the pump. The entry cone has to be grouted into concrete. If there is already an intake chamber which can not be emptied a special entry cone which is mounted under the bellmouth can be delivered.

8. Non-pull-out design vs pull-out design

The rotating and non-rotating components of the pump constitute an assembly unit. For inspection of internal pump components, the pump is lifted out and dismantled.

Presentation pull out design



9. Drive Coupling

The drive coupling between pump drive and pump is included in KSB's scope of supply. KSB use curved tooth type or flexible disc type coupling which exhibits the following properties: transmission of the existing torque based on the specified speed.

The double-cardanic design allows for compensation of axial, radial and angular displacements. The coupling is balanced prior to the first operation of the pump. The coupling manufacturer will be choosed by KSB.

10. Pump foundation

The pump is arranged on a foundation ring embedded in concrete. In case the water level is above the height of the installation floor of the pump, sealing by an O-ring between the foundation ring embedded in concrete and the installation flange of the pump is considered. The foundation ring structure is provided with screws/bolts for levelling the foundation ring during setting in concrete and for fastening the foundation ring in the foundation.

11. Shaft guide bearings

The radial guide bearings are lubricated by the medium handled and do not require any separate, external lubricating water. The rotating shaft protecting sleeves are made of corrosion-resistant CrNi steel, the non-rotating bearing bushes of Thordon.



Thordon Bearing



KSB Residur Bearing

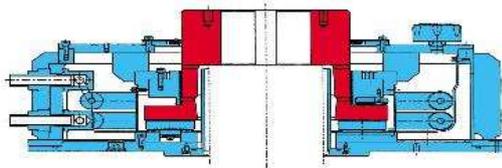
12. Thrust Bearing

The thrust bearing will be installed between pump and pump drive for absorption of the axial forces. The thrust bearing can be designed as an oil-lubricated segmental bearing or as an anti friction bearing. KSB will choose the best solution according to the requested operation data.

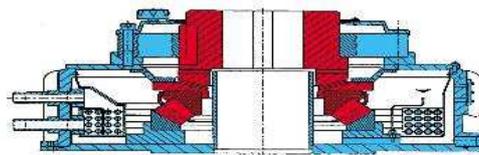
Cooling is effected continuously by a self-cooling water system supplied by the pump discharge.

The shaft nut, which the impeller clearance is adjusted with, is situated above the bearing housing. The adjustment can be performed without dismantling of pump components.

The bearing is designed on the basis of the operating conditions specified and in consideration of the hydraulic axial thrust as well as the weights of the rotating pump components.



Tilt pad bearing



Anti friction bearing

13. Non-Reverse ratchet

The cooling water pump offered is not equipped with a non-reverse ratchet. Starting must be clarified with the motor manufacturer under any circumstances since the reverse speed may be higher than the normal speed. This must be considered by the motor manufacturer.

14. Instruments

The instruments required for safe operation of the pumps are in accordance with KSB's standard instruments (see attached instrumentation list).

15. Coating

For coating Information see attached data sheet

16. Drive

The pump is driven by a direct-drive electric motor not included in KSB's scope of supply. The technical data and geometric connection dimensions of the motor will be clarified by you and shall be available to us at the time of contract award.

We assume that the motor's exhaust air is dissipated in a way that the pump's thrust bearing arranged underneath the motor is not heated up. If the motor has inlet or exhaust air openings at the bottom, it is important that these openings are not covered by KSB's support structure.

The weights and flange dimensions indicated in the installation plan are based on KSB's presumptions. Significant deviations require the corresponding price corrections.

The motor manufacturer shall ensure that harmful currents (due to shaft voltage, unipolar voltage) do not flow into the pump via the drive coupling, which would lead to destruction of, for example, drive coupling and/or thrust bearing.

17. Material Variant

The material combination of the pump components has been selected on the basis of the specified medium handled, the associated water chemistry and Your specifications.

The attached "parts list" and "sectional drawing" show the essential pump components which come or do not come into contact with the medium handled and indicate the selected materials.