

INSTRUCTIONS ON INSTALLATION, OPERATION AND MAINTENANACE FOR SAM TURBO PUMP TYPE “ZM”



SAM TURBO INDUSTRY LIMITED

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SAM TURBO INDUSTRY LIMITED

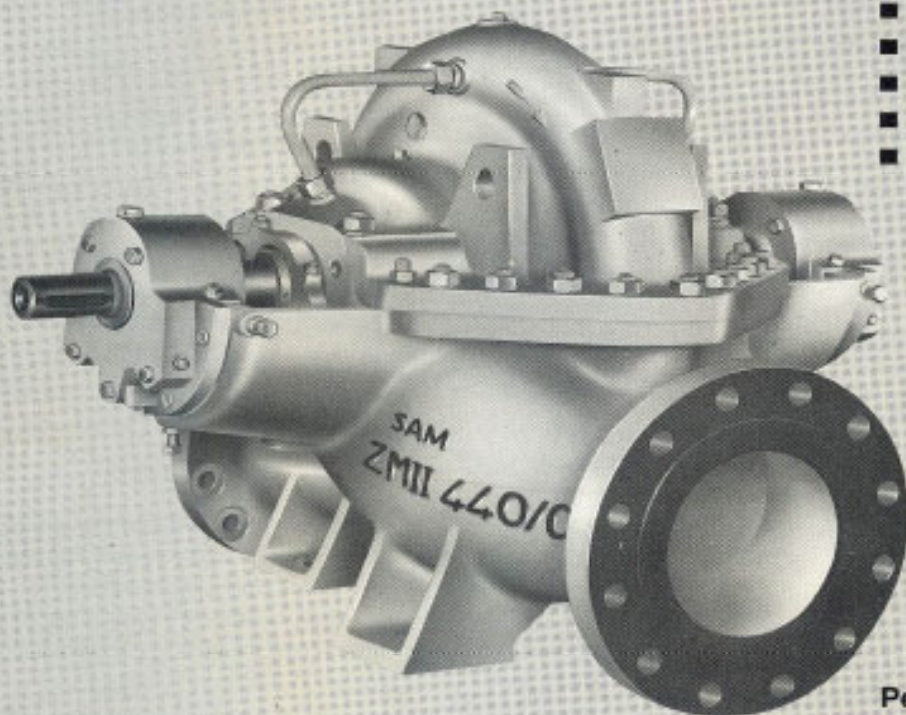
UNDER LICENCE FROM



THYSSEN RUHRPUMPEN GMBH

Volute Casing Centrifugal Pumps
Process and Transfer Pumps

ZM



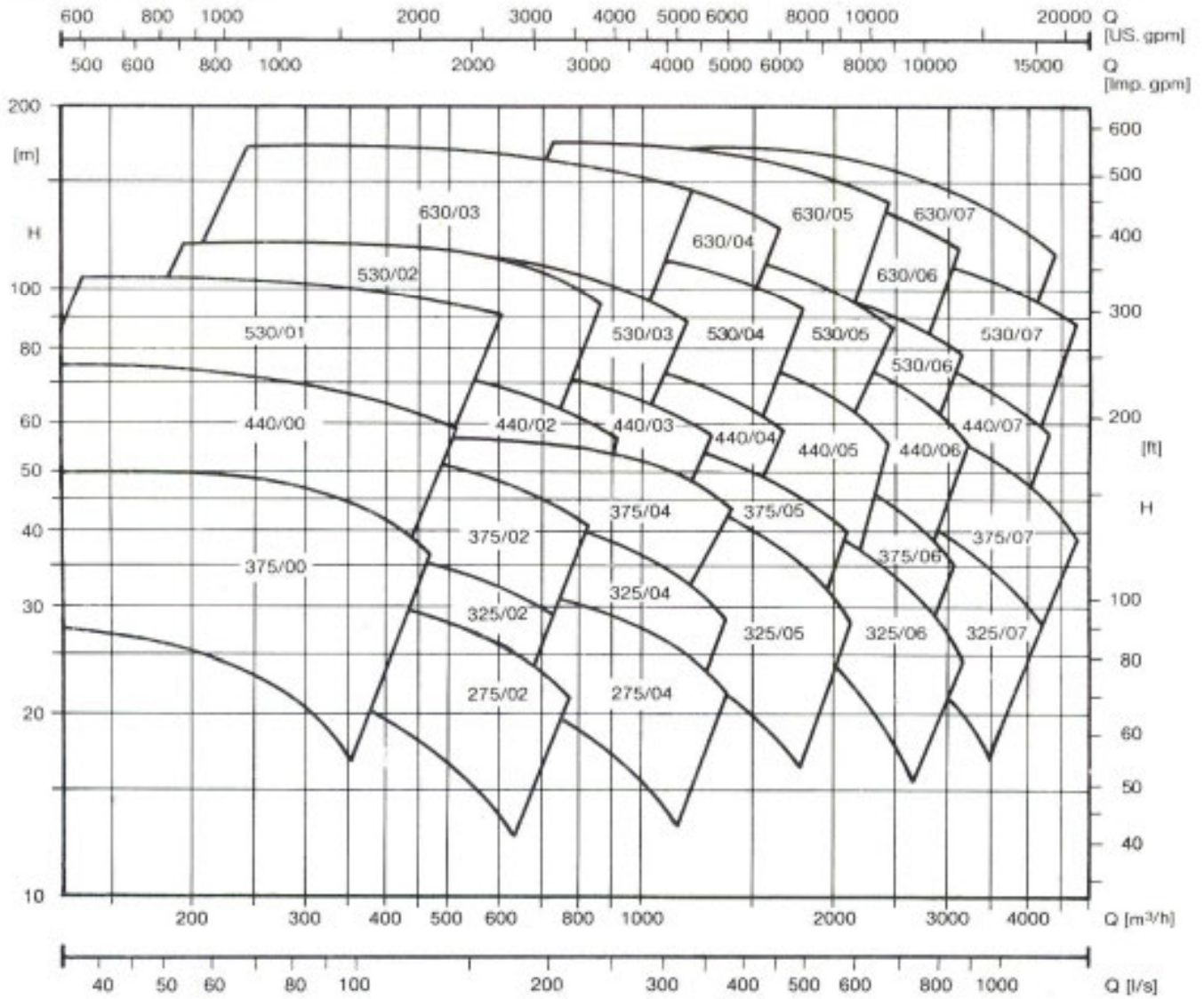
- Horizontal Arrangement
- Axially Split Casing
- Inline Design
- Double Entry Impeller
- Bearings on Both Sides

Performance Range:

Capacity	Q	150 to 8000	m ³ /h
		650 to 34650	gpm
Head	H	16 to 220	m
		52 to 720	ft
Speed	n	up to 3000	min ⁻¹
Temperature	t	-10 to 220	°C
Ambient			
Temperature			to -55 °C
Pump Discharge			
Pressure	P _d	up to 40	bar
			580 psi
Discharge			
Branch Size	DN _s	150 to 700	mm
		6 to 28	"

Selection Chart ZM II

$n = 1480 \text{ min}^{-1}$



ZM - II, III Interchangeability Table

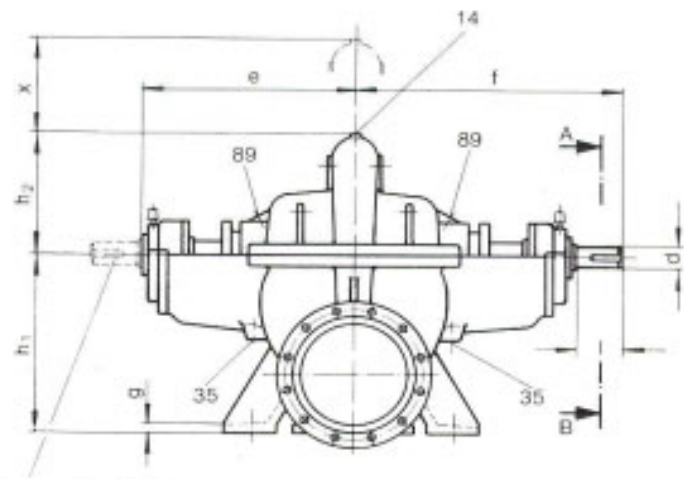
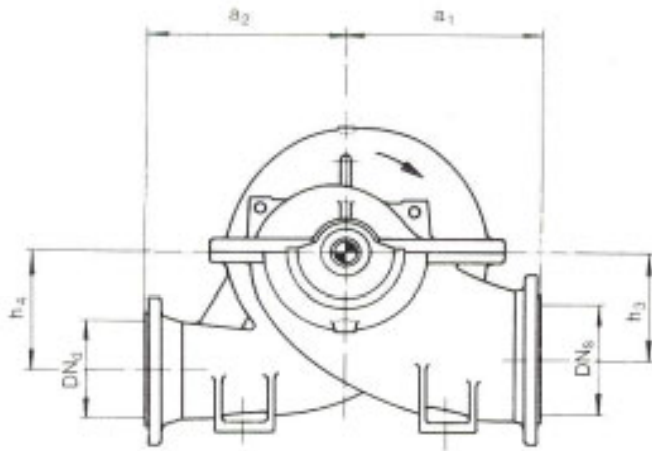
"Standard Design"

Size		275/02	375/00	275/04	325/02	325/04	440/00	325/05	375/02	375/04	440/02	440/03	530/01	325/06	325/07	375/05	440/04	530/02	530/03	530/04	630/03	
Bearing Size		40			50				60					70								
Part / Part No.																						
Bearing Housing	350																					
Radial Ball Bearing	321																					
Axial Ball Bearing	320	-																				
Radial Roller Bearing	322	-																				
Impeller Nut	922																					
Mechanical Seal	433																					
Pump Shaft	211																					
Case Wear Ring	502																					
Impeller	204																					
Casing	105																					

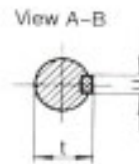
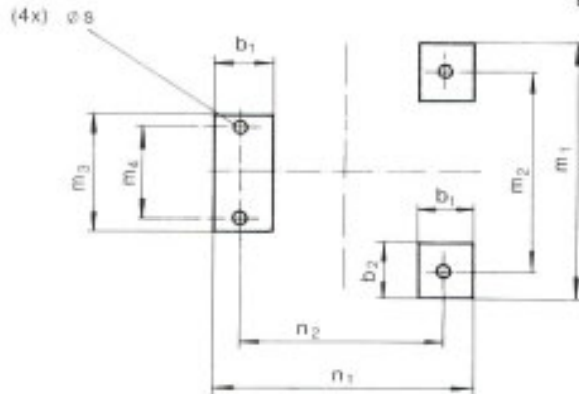
Size		375/06	375/07	440/05	440/06	530/05	630/04	440/07	530/06	630/05	530/07	530/08	630/06	630/07	630/08	750/08	530/09	680/09
Bearing Size		80						90			100				110	120		
Part / Part No.		80						90			100				110	120		
Bearing Housing	350	/						/			/				/	/		
Radial Ball Bearing	321	/																
Axial Ball Bearing	320	/						/			/				/	/		
Radial Roller Bearing	322	-						/			/				/	/		
Impeller Nut	922	/						/			/				/	/		
Mechanical Seal	433	/						/			/				/	/		
Pump Shaft	211	/						/			/				/	/		
Case Wear Ring	502																	
Impeller	234																	
Casing	105																	

Pump Dimensional Drawing

(Dimensions in mm)



Shaft end for counter clockwise direction of rotation



Flange connection sizes in accordance with ANSI B 16.5 for flange rating 150 flange rating 300

Withdrawal dimension x for dismantling upper casing half

Fitting key and keyway dimensions according to DIN 6885

14 Vent NPT 1/2"
35 Leakage drain NPT 1/2"
89 Sealing liquid NPT 1/2"

Size	Suct./Disch. Flange		Main Dimensions										Shaft End				Foot Dimensions										
	DN _s	DN _d	a ₁	a ₂	e	f	h ₁	h ₂	h ₃	h ₄	x	d	l	t	u	b ₁	b ₂	g	m ₁	m ₂	m ₃	m ₄	n ₁	n ₂	s		
ZM I 325/01	200	150	380	350	455	550	370	370	225	225	200	50	90	53,5	14	130	130	18	480	350	260	170	480	350			
ZM I 325/04	350	300	550	700	615	740	550	330	300	300	180					150	150	25	680	530	300	230	680	530			
ZM I 325/01	300	200	425	420	570	660	400	300	215	250	200	60	100	64	18	130	130	18	480	350	260	170	480	350	28		
ZM I 325/02																											
ZM I 325/03	300	200	500	400	620	755	500	350	280	280	200								600	450		200	600	450	28		
ZM I 325/04	350	300	625	550	635	810	630	380	325	325	220	70	125	74,5	20	150	150	30	680	530	300	230	680	530	35		
ZM I 325/05	400		650	540	625	800	650	410	375	335	200																
ZM II 275/02	300	250	500	420			490	300	290	285	170	40	70	43	12												
ZM II 275/04	400	350	575	450	510	600	610	375	325	375	180	50	90	53,5	14	150	150	20	680	530	300	230	680	530	28		
ZM II 325/02	300	250	500	430			490	310	252	285	170																
ZM II 325/04	400	300	530	450	510	600	570	330	325	325	180	50	90	53,5	14				620	470			600	510			
ZM II 325/05		350	650	600	615	740	630	410	330	375	200	60	100	64	18	150	150	25	680	530	300	230	680	530	28		

Pump Dimensional Drawing

(Continuation)

Size	Suct./Disch. Flange		Main Dimensions									Shaft End				Foot Dimensions									
	DN _s	DN _d	a ₁	a ₂	e	f	h ₁	h ₂	h ₃	h ₄	x	d	l	t	u	b ₁	b ₂	g	m ₁	m ₂	m ₃	m ₄	n ₁	n ₂	s
ZM II 325/06	600	400	800	600	725	835	800	540	440	460	210	70	125	74,5	20	200	200	30	950	750	400	300	950	750	35
ZM II 325/07		500	850	750			850	470	380	450	250														
ZM II 375/00	200	150	450	390	460	540	400	290	225	275	200	40	70	43	12	130	130	18	480	350	260	170	480	350	28
ZM II 375/02	300	250	500	485	580	680	480	320	290	300		60	100	64	18	150	150	20	680	530	300	230	680	530	
ZM II 375/04	350	300	700	600	600	740	630	395	350	350	205	70	125	74,5	20	150	150	25	680	530	300	230	680	530	
ZM II 375/05	500	350	650		650	790		435	330	390	210														
ZM II 375/06	500	400	800	600	885	775	800	500	400	470	235	80	150	85	22	200	200	30	950	750	400	300	950	750	35
ZM II 375/07	600	500		700	935		800	400	460	270															
ZM II 440/00	200	150	470	410	465	550	400	300	225	275	230	50	90	53,5	14	130	130	18	480	350	260	170	480	350	28
ZM II 440/02	300	200	550	480	580	680	480	365	290	325	235	80	100	64	18	150	150	20	680	530	300	230	680	530	
ZM II 440/03	350	250	600	485			550	370	320	350	240														
ZM II 440/04	400	300			600	485	600	740	610	410	330	390	245	70	125	74,5	20	150	150	25	680	530	300	230	680
ZM II 440/05	500	350	700	600			775	885	700	460	370	430	245												
ZM II 440/06		400	810	610	800	950	870	800	580	400	465	260	90	170	95	25	200	200	30	950	750	400	300	950	750
ZM II 440/07	600	500	800	600				800	500	430	480	300													
ZM II 530/01	250	200	540	480	580	680	460	390	280	310	265	60	100	64	18	150	150	20	600	450	300	200	600	450	28
ZM II 530/02	300	250	560	540	615	740	500	400	315	325	285	70	125	74,5	20				680	530	300	230	680	530	
ZM II 530/03	350		620	505			550	405	320	355	295					300	330	445	295	80	150	85	22	200	200
ZM II 530/04	400	300	670	550	600	425	330	380	300																
ZM II 530/05	400	350	700	600	725	835				660	465	445	295	445	295	80	150	85	22	200	200	30	950	750	400
ZM II 530/06		500	820	820	825	1010	800	550	400	480	380														
ZM II 530/07	700	500	900	800	890	1130	950	580	460	560	315	100	210	105	28	200	200	30	950	750	400	300	950	750	35
ZM II 630/03	350	250	700	700	665	790	650	480	320	430	330	70	125	74,5	20				1000	800			400	300	
ZM II 630/04	400	300	800	800	815	925	680	530	350	460	350	80	150	85	22	200	200	35	950	750	400	300			950
ZM II 630/05	500	350	820	820	825	1010	800	550	400	480	380	90	185	95	25				1000	800			400	300	1250
ZM II 630/06		400	900	800	890	1130	900	560	460	500	380	100	210	105	28	1000	800	400	300	1250	1050				
ZM II 630/07	600	500	1000	900	1000	1230	1000	560	480	530	380	100	210	105	28	200	200			35	1000	800	400	300	1250
ZM III 440/07	600	500	800	600	800	950	870	500	430	480	300	90	170	95	25			200	200		30	950			750
ZM III 530/07	700		900	800	890	1130	950	580	460	560	315	100	210	105	28	1000	800			400		300	1250	1050	
ZM III 530/08		600	1050	900	1000	1230	1050	660	580	630	315	100	210	105	28	200	200	35	1000		800		400	300	1250
ZM III 530/09	800	700	1150	1000	1160	1425	1150	750	650	700	380	120	210	127	32				200	200	35	1000			800
ZM III 630/08	700	600	1100	1100	1000	1230	1050	725	540	640		100		106	28	300	300	40				1300	1000	700	500
ZM III 680/09	800	700		1200	1160	1425	1150	730	620	600	120	127	32	200	200				35	1000	800	400	300		
ZM III 750/09		600	800	1050	1300	1000	800	600	650	110	116	28	200			200	35	1000		800	400			300	1250

Design subject to revision

SAM TURBO INDUSTRY LIMITED

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WARRANTY

We warrant that the pump supplied by us is free from defective material and faulty workmanship. This warranty holds good for a period of 12 months from the date of commissioning of the equipment or 18 months from the date of despatch from our factory, whichever is earlier.

Our liability in respect of any complaint is limited to replacing part/parts free of charge ex-works or repairs of the defective part/parts only to the extent that such replacement / repairs are attributable to or arise solely from faulty workmanship or defective material.

We warrant the materials for the chemical composition and mechanical properties of the relevant standard only and **not for corrosion and erosion.**

The warranty holds good only for the products manufactured by us.

SAM TURBO INDUSTRY LIMITED

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1.0 General

These operating instructions contain important information about the installation, operation and service of the machine. It is therefore imperative that these operating instructions be read before installation and commencement of operation by the installing engineer as well as by the responsible specialist / operating personnel. They must always be available in the operational area of the machine / Plant.

Please have the following information ready in the case of queries:

- The Sl. No. and the type designation of the pump. You can find both of these on the first page of these operation instructions or on the nameplate fixed to the pump.
- When ordering spare parts we would further request that you give the description of the required parts, together with their part numbers. You can find these on the sectional drawing and spare part list.

1.1 Operational Data

Application	: -	
Pumping Liquid	: -	
Discharge (Q)	: -	m ³ / hr
Total Head (H)	: -	m
Speed	: -	rpm
Power (Pump)	: -	kw
NPSHR	: -	m

Data of Medium

Temperature	: -	° C
Density	: -	Kg / m ³
Viscosity	: -	Cp

Maintenance Data

Oil Viscosity for Bearing Lubrication	: -	ISO VG 46
Max. allowable bearing temperature	: -	80° C

Inspection Data

Seal piping Plan	: -
Coupling Make	: -
Size	: -

Important Comment

All applications not specifically stated in these operating instructions require consultation with the manufacturer.

2 Safety

The present operating instructions are specifically meant for operating and maintenance personnel. These instructions convey important information as pre-requisite for safe operation at / with the pump and also for operational reliability of the machine.

The operating instructions should be carefully read prior to initial operation of the pump, and you should make yourselves thoroughly familiar with the under mentioned safety instructions.

2.1 General Risks in Case of Non – Observance of Safety Rules

This pump has been built in accordance with the actual state of art which makes it a reliable unit. However, certain hazards may originate from the pump if it is used by untrained personnel in-expertly or if it is not used in accordance with the rules. This might entail impending dangers

- for life and limb,
- for the machine and other user property, and
- for efficient operation of the machine

Any person in the user's works engaged in installation, operation, maintenance or repair of the machine must carefully read and understand these operating instructions, in particular section "Safety".

2.2 Safety – Conscious Operation

The pump must be operated by trained and authorized operators only. Rules of responsibility regarding operation of the pump must be clearly defined and adhered to in order to avoid unclear responsibilities regarding safety matters.

For all works, like installation, operation, rearrangements, adjustments, maintenance and repairs, the switch-off procedures mentioned in the operating instructions are to be adhered to in any circumstances.

All pertinent rules for prevention of accidents as well as existing internal user's regulations for work, operation and safety are to be observed. Further, it must be ensured that only proper tools, perfect and reliable ropes and lifting equipment are used.

2.3 Particular Hazards

Operating a centrifugal pump may entail particular hazards from the following:

- Pumping Medium
- Pressure
- Temperature
- Rotating Parts
- Electric Energy
- Inappropriate use

Penetration / Leakage of pumping medium may cause injuries, scalding, acid burns, intoxication etc. Therefore,

- a) Tighten Screw connections applying the specific torque;
- b) Check flat and profile packings prior to installation for damages and insert them carefully;
- c) Do not use any damaged packings;
- d) Do not use distort profile packings;
- e) Measuring connections and other screwing closing the accesses to the pressure carrying interior pump space must be sealed and tightened perfectly.
- f) Temperatures and leakage quantity at the shaft seal are to be monitored carefully to recognize in time any danger of failure.

Overload conditions are to be avoided under any circumstances because they may lead to failure of a component due to excessive mechanical stress. Such overload conditions will occur if the pump is running beyond its proper use, in particular if the max. Permissible values are exceeded for

- a) RPM
- b) Admission pressure
- c) Temperature if
- d) The pump has not been vented properly prior to starting,
- e) Minimum flow is not obtained, or
- f) If a critical backflow can occur after pump switch – off.

2.4 Prohibition of Unauthorized Changes

Unauthorized modifications, additions or changes to pump and other component of the unit are not permitted for safety reasons.

2.5 Additional Hazards

The forces and moments acting from the piping on the pump connection pieces (e.g. by distortion, expansion by temperature) must not exceed the permissible loads on the connection pieces as otherwise the pump's safety will be impaired.

When using other means and agents (like Cleaning Fluids, fats or lubrication oil), the supplier's safety instruction are to be observed without fail.

Old parts / matters and waste oil must be disposed of in a way not harmful to the environment.

3.0 Conservation

All exposed, machined, working surfaces (flanges, seals, surfaces supporting the motor), shaft ends, unpainted couplings and the like have been cleaned and treated with anticorrosive agents. After being cleaned, all parts inside the pump housing have been sprayed with anticorrosive agents. The period of protection offered by these conservation measures is approximately 18 months, if stored in a dry place.

If stored under unfavourable climatic conditions, this protective period may be considerably reduced.

Should the anticorrosive layer become damaged, it can be rectified by repainting or respraying.

The anticorrosive layer applied to the exposed parts does not need to be removed before putting the pump into operation.

3.1 Intermediate Storage

Of the unit is not installed immediately after delivery, it should be safely stored.

- Store in a place free from vibrations.
- Check the packaging for damage every 3 months
- Repair damaged places.

4.0 General Structure of the Pump

This pump is a horizontal, split casing, single stage, double suction centrifugal pump of especially robust design which renders it suitable for the most arduous duties.

Special Features:

The pump casing is axially split along the horizontal centre line of the shaft, hence the complete rotor can be removed without dismantling the suction and discharge piping. The suction and discharge branches are located on the lower casing half and are in horizontal position.

The impeller is delivered with wear rings (option). Due to the double suction design the impeller is hydrodynamically balanced, any remaining axial thrust, caused by any adverse flow conditions in the suction piping, will be absorbed by the thrust bearing.

The pump casing is provided with replaceable wear rings. The complete rotor, including bearings and wear rings can be dismantled or installed into the lower part of the casing as a complete unit, without altering the position of this part.

Vent valve for the pump is located on top of the volute of the upper part of the casing if required. The drain connections are located on the lowest points of the suction and discharge branches.

5.0 **Assembly of Rotor and Pump**

Rotating Element, Bearings, Pump Casing

Before assembling parts of the rotor, the bearings and the pump casing ascertain that all plane surfaces are absolutely clean and without any burr

Before mounting check that shaft runs true. Out of true must not exceed the value of 0.03 mm.

The parts should be assembled in the following sequence:

a) **Rotor**

Shaft	Part No. 211
Key	Part No. 940.01
Impeller	Part No. 234
with Impeller rings	Part No. 503

When mounting the impeller, pay attention to the direction of rotation of the entry of blade!!

Shaft Sleeve	Part No.524
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With same position numbers in sectional drawing both shaft nuts have right – hand thread.	Part No. 921
With different part numbers one impeller nut will be provided with left – hand and the other with right – hand thread.	(optional)

Note : - The thread of the nut of the stationary bearing side has the same direction as the direction of rotation of the shaft, when looking at the shaft against the drive side.

The impeller nuts should not be tightened now	
Push casing wear rings with keys over impeller rings	Part No. 502

	Part No. 940.10
Push neck bush (Optional)	Part No. 456

b) **Mechanical Seal (See Seal drawing) Sealing Cover**

First of all, the sealing covers are completely preassembled. This includes the installation of the cover neck bushes, the o – rings and the correct mounting of the stationary seal ring. When mounting the stationary seal rings pay attention to pins in the seal cover. If pins are incorporated, the stationary rings with their grooves and bores must be pushed carefully over these pins.

When screwing on the covers make sure the leakage drain bores point downwards. Here too, the sleeve nut (or the impeller nut) must not yet be tightened and secured.

c) Shaft Bearing

After complete assembly of the rotor and bearings this structural unit will be inserted into the pump casing lower half (Part 105 . 01), taking care that the half collar of the neck bushes (Part 456 . 02) is inserted in such a way that it is not towering the gasket and that the fitting keys (Part 940 . 10) are inserted in the grooves in the pump casing lower part. Furthermore the half collars of the neck bushes and the wear rings have to be pushed to the casing lower part up to solid fitting. Subsequently, the complete rotor will be centered by means of adjusting screws which are positioned at the casted on bearing lanterns of the casing lower part, and secured with the nuts belonging to it.

Now the bearing housings are bolted to the pump lower half. Then adjust and secure the throwers (Part 507).

Adjustment of Impeller Center Position

After completion of the assembly the impeller must be in the centre of the pump volute. This position is achieved with the aid of the sleeve nuts (Part 921). After adjustment the sleeve nuts are firmly tightened on both sides and secured with keys and circlips. Now the radial clearances between the impeller and casing wear ring (Part 234 and 503) have to be checked.

Locating of the Pump Casing Upper Half

Prior to locating the pump casing upper half (Part 105 . 02) the casing gasket plate (Part 400 . 01) must be checked. It must be undamaged and clean, and its shape must conform to that of the pump casing. Any gaps must be eliminated, particularly in the areas where the gasket plate is in contact with other sealing areas, as gaps would lead to leakage within the pump casing (casing wear rings and neck bushes).

For the same reason and this applies in particular to pumps with mechanical seal the front faces of the gasket plates are cut to size after the pump casing upper half has been screwed on to ensure that leakages are prevented on the gaskets of the mechanical seal covers.

Generally compressed asbestos fibre gasket of 1.0 mm thickness – will be provided as gasket plate. Mounting of the pump casing upper half in accordance with figure. (see Instructions for tightening the flange screws).

5.1 Recommended Spare Parts

Spare parts should already be in stock at eh client's for the initial start up. In order to minimize down – time we recommend to obtain one complete set of spare parts.

- 1 Complete rotor assembly
- 1 Set of wear rings
- 1 Set of bearings
- 2 – 3 Sets of complete mech. Seals, resp. / Stuffing box packings

For normal operation of several pumps of the same size we recommend a minimum storage according to VDMA – rule 24 296, sheet 1.

The following VDMA instructions have been based on a 2 years, continuous operation.

Spare Parts	Number of pumps (include. Stand – by Pumps)						
	2	3	4	5	6 & 7	8 & 9	10 & more
	Number of Spare Parts						
Impeller	1	1	1	2	2	3	30%
Case Wear ring	2	2	2	3	3	4	50%
Impeller Wear ring	2	2	2	3	3	4	50%
Shaft with key & shaft screws or nuts	1	1	2	2	2	3	30%
Bearings	1	1	2	2	3	4	50%
Shaft Protecting Sleeve	2	2	2	3	3	4	50%
Thrower	1	1	2	2	2	3	30%
Packing rings	16	16	24	24	24	32	40%
Gaskets for pump casing sets:	4	6	8	8	9	12	150%
Other gaskets sets:	4	6	8	8	9	10	100%

6.0 FOUNDATION AND ALIGNMENT OF THE PUMP

General Remarks

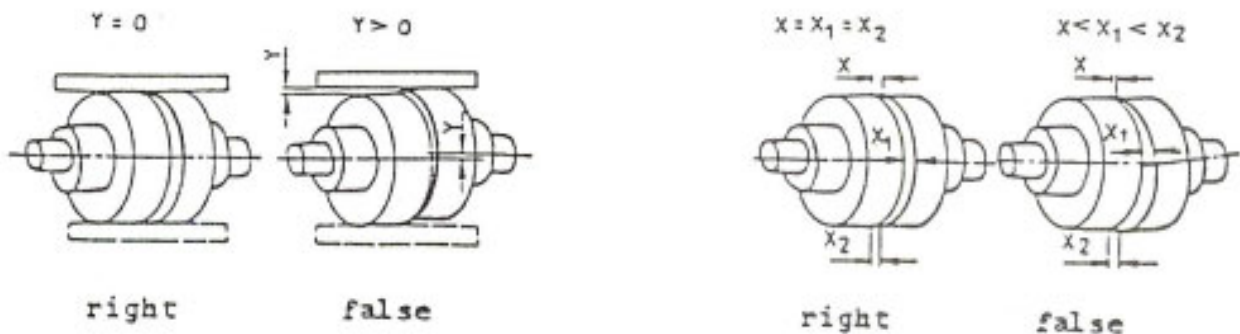
Trouble – free operation of the pump set can only be ensured on the condition that it is carefully and correctly installed. Otherwise premature wear of the inner pump parts is to be expected. Therefore the installation should be carried out by skilled and experienced personnel.

We cannot be held responsible for any defects caused by non – observance of our recommendations.

Alignment

The pump set must be placed on a well bonded foundation block only where it is to be leveled by means of the jacking screws. For correct alignment pump and driver must be on the same level. If not previously done the mounting holes in the base plate for fixing the driver are to be bored according to the instruction.

The coupling must be checked and re – aligned if necessary. Unless otherwise stated in the instructions for the coupling, the maximum allowable axial or radial deviation must not exceed 0.3 mm (see figure). The distance between the coupling faces given in the construction drawing must be accurately maintained.



Base plate and foundation bolts should be grouted with a quick setting cement mixture. The entire space under the base plate must be filled with grout, thus preventing any air cavities.

When the grouting mixture has set properly, the foundation bolts must be evenly and firmly tightened.

Base plates can never be made so rigid that no distortion during transit and installation can be guaranteed. Their rigidity derives from grouting with cement mortar. Therefore, dowelling of the pump and driver is done later when the pumping set has been leveled, grouted and aligned exactly in its final position on the spot.

Precision alignment of the pumping set is done by re-aligning the driver before connecting the piping. Make use of thin plates. Checking by means of dial gauge, straight-edge and feeler gauge.

Finally pump and driver are dowelled to the base plate, if necessary.

7.0 TROUBLES AND THEIR CAUSES

Careful attention to the pump will avoid unnecessary expense and disruption. The type of disruption will often determine whether the operating problem is due to mechanical or hydraulic faults.

Various types of disruption often have the same cause. For this reason we have classified and composed a list for various types of operating problems and their relating causes. In most cases the solution for any operating problem can be gathered from this list.

Type of Operating Troubles	Key No.
Pump does not deliver	1 – 2 – 3 – 4 – 6 – 11 – 13 – 14 – 19 – 23
Capacity too small	2 – 3 – 4 – 5 – 6 – 7 – 8 – 11 – 13 – 14 – 17 – 19 – 20 – 23 – 29 – 31 – 52
Discharge pressure too small	4 – 5 – 11 – 13 – 15 – 17 – 19 – 29 – 31
Excessive power required	12 – 13 – 15 – 16 – 17 – 23 – 24 – 26 – 27 – 29 – 33 – 34 – 37 – 40 – 43 – 48 – 49 – 52
Excessive stuffing box leakage	10 – 24 – 26 – 32 – 33 – 34 – 35 – 36 – 38 – 39 – 47 – 48
Excessive stuffing box temperature	9 – 10 – 24 – 26 – 33 – 34 – 35 – 36 – 37 – 38 – 39 – 48
Excessive wear of packing or mechanical seal	9 – 10 – 24 – 26 – 28 – 32 – 33 – 34 – 35 – 36 – 37 – 38 – 39 – 48
Excessive noise or vibration of pump	2 – 3 – 4 – 5 – 6 – 7 – 15 – 18 – 23 – 24 – 25 – 26 – 27 – 28 – 31 – 35 – 36 – 40 – 42 – 43 – 44 – 46 – 49
Overheating or excessive wear of bearings	12 – 14 – 15 – 16 – 17 – 18 – 24 – 25 – 26 – 27 – 28 – 30 – 36 – 38 – 40 – 41 – 42 – 43 – 44 – 45 – 49 – 50 – 51
Overheating and seizing of pump	1 – 4 – 18 – 19 – 21 – 22 – 24 – 25 – 27 – 28 – 35 – 36 – 40 – 41 – 49

Possible Reasons for Operating Troubles

a) Hydraulic Reasons

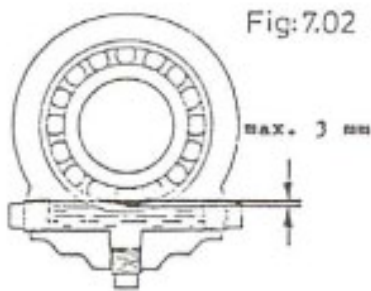
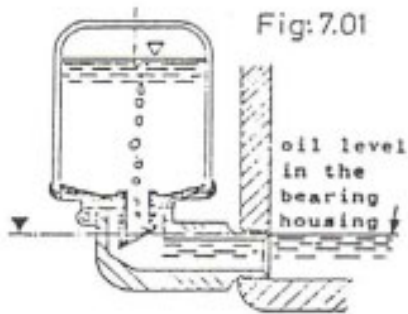
1. Pump not vented
2. Pump or suction line not completely filled with liquid
3. Suction lift too great, suction head too small
4. Insufficient margin between suction and vapour pressures
5. Excessive air or gas in the pumping liquid
6. Air pockets in suction line
7. Air inhaled into suction line
8. Air inhaled through stuffing box
9. Flushing or circulation line blocked
10. Lantern ring incorrectly located
11. Speed too low
12. Speed too high
13. Incorrect direction of rotation
14. Total head of the system greater than specified
15. Total head lower than specified
16. Specific gravity of liquid different from specified value
17. Actual viscosity differs from specified value
18. Operation at too low capacity
19. Pumps are unsuitable for parallel operation
20. Strainer blocked
21. Actual temperature of fluid differs from specified value
22. Too fast temperature changes

b) Mechanical Reasons

23. Foreign bodies in the impeller
24. Incorrect alignment
25. Foundation block too weak
26. Bent Shaft
27. Rubbing of rotating parts on fixed parts
28. Worn bearings
29. Worn wear rings, distance sleeves and throat bushes
30. Wrong design of suction line, leading to asymmetrical flow or vortexing
31. Impeller damaged
32. Shaft sleeve worn
33. Incorrectly installed packing
34. Incorrect packing type installed
35. Non concentric running of rotor due to bearing wear or incorrect alignment
36. Rotor not properly balanced
37. Stuffing box pulled up too tightly
38. Insufficient cooling
39. Dirt or grit in sealing, flushing or circulating fluids
40. Excessive thrust
41. Excessive oil in bearing housing, blocked oil passages
42. Defective lubrication
43. Bearings incorrectly installed or damaged during installation
44. Dirt in bearings or lubrication system
45. Access of water into the bearings
46. Difficulties arising from the pump driver
47. Sealing rings of mechanical seal damaged
48. Incorrectly adjusted mechanical seal, wrong spring tension
49. Incorrectly installed rotor, shaft nuts loose
50. Unsuitable lubricant
51. Oil level too low
52. Inner leaking due to damaged sealing

Constant – Level – Oiler

Constant – level – oilers ensure a constant oil level in the bearing housing if the tanks are always filled adequately and if the connection bores for the oil are exactly horizontal (see also Figs. 7.03 and 7.04).

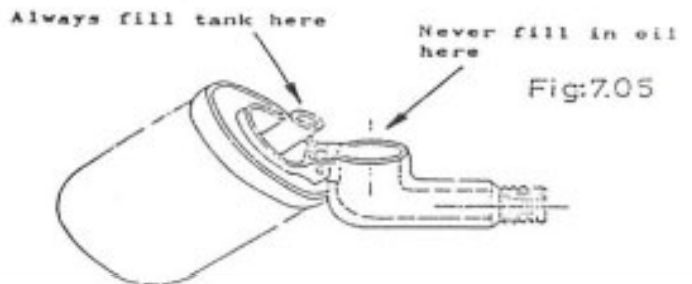
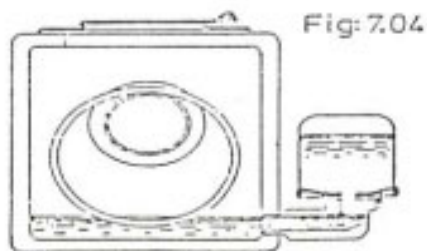
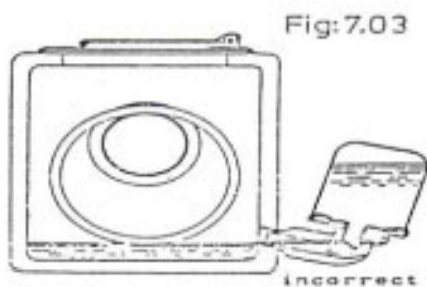


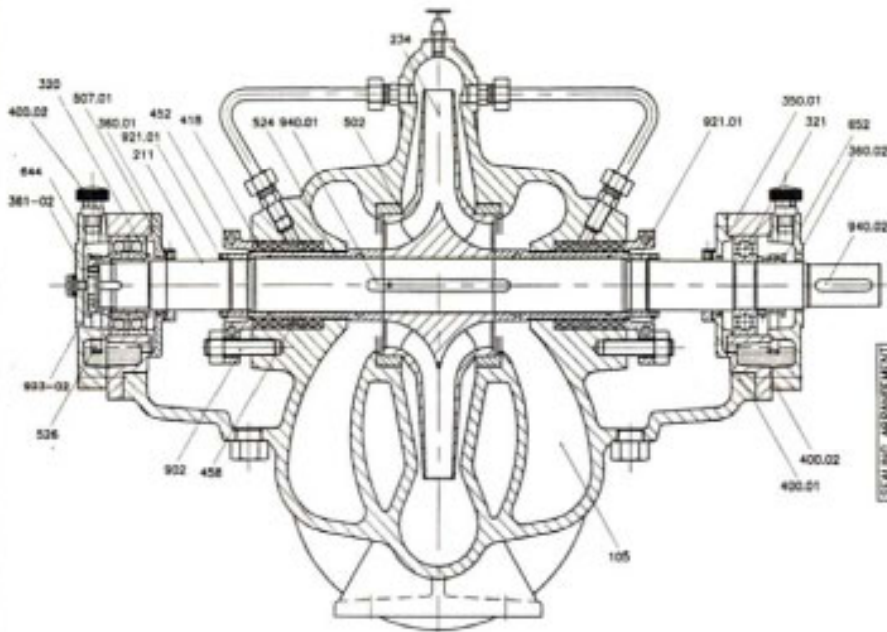
For a dipping lubrication of ball or roller bearings the oilers are mounted in such a way that oil level will not exceed the lowest point of the inside diameter of the bearing outer ring by more than 3 mm (see Fig. 7.02).

With oil ring lubrication the oil level must be slightly above the inside diameter of the lubricating ring (Fig. 7.04). If the ring does not lift up any oil, the oil level must be raised by shortening the oil tank outlet pipe (Fig. 7.06).

The oil bath in the bearing housing must never be filled or topped up via the screw socket of the oiler. To obtain the oil level required in the bearing, the tank must be filled until no oil will flow out of the tank (Fig. 7.05). The tank is to be topped up as soon as about two thirds of the fillings have been used.

Constant – level – oilers are nearly maintenance free. The oil level can be checked any time.





PART No.	PART NAME	MATERIAL
105	CASING (TOP & BOTTOM)	
234	IMPELLER	
502	CASING WEAR RING	
350.01	BEARING HOUSING	ASTM A 48 CLASS 408
361.02/360.02	BEARING END COVER	ASTM A 48 CLASS 408
360.01	BEARING COVER (INNER)	ASTM A 48 CLASS 408
211	PUMP SHAFT	AISI-4140
921.01	SLEEVE NUT	AISI-410
507.01	THROWER	AISI-410
526	CENTERING SLEEVE	AISI-410
652	OIL SLEEVE	STEEL
923.02	BEARING NUT	STEEL
844	DL RING	BRONZE
940.01	KEY (IMPELLER)	AISI-431
940.02	KEY (COUPLING)	AISI-431
321	BALL BEARING (DRIVE END)	STEEL
320	ANG CONTACT BALL BRG(N.D.E)	STEEL
-	GASKET (CASING)	CAF - 9
400.01	FLAT GASKET (360.01/350.01)	CAF - 9
400.02	FLAT GASKET (361.01/350.01)	CAF - 9
-	STUD (CASING)	AISI-316
452	GLAND	ALLOY CI
458	LANTERN RING	AISI-410
418	GLAND PACKING	TGA
524	SHAFT SLEEVE(FOR PACKING)	AISI-410(DI)
902	STUD(GLAND)	AISI-316
XXX	GLAND PLATE(FOR MECH SEAL)	
XXX	SHAFT SLEEVE(FOR MECH SEAL)	N/A
XXX	STUD (FOR MECH SEAL)	

SEALING ARRANGEMENT
MECHANICAL GLAND PACKING


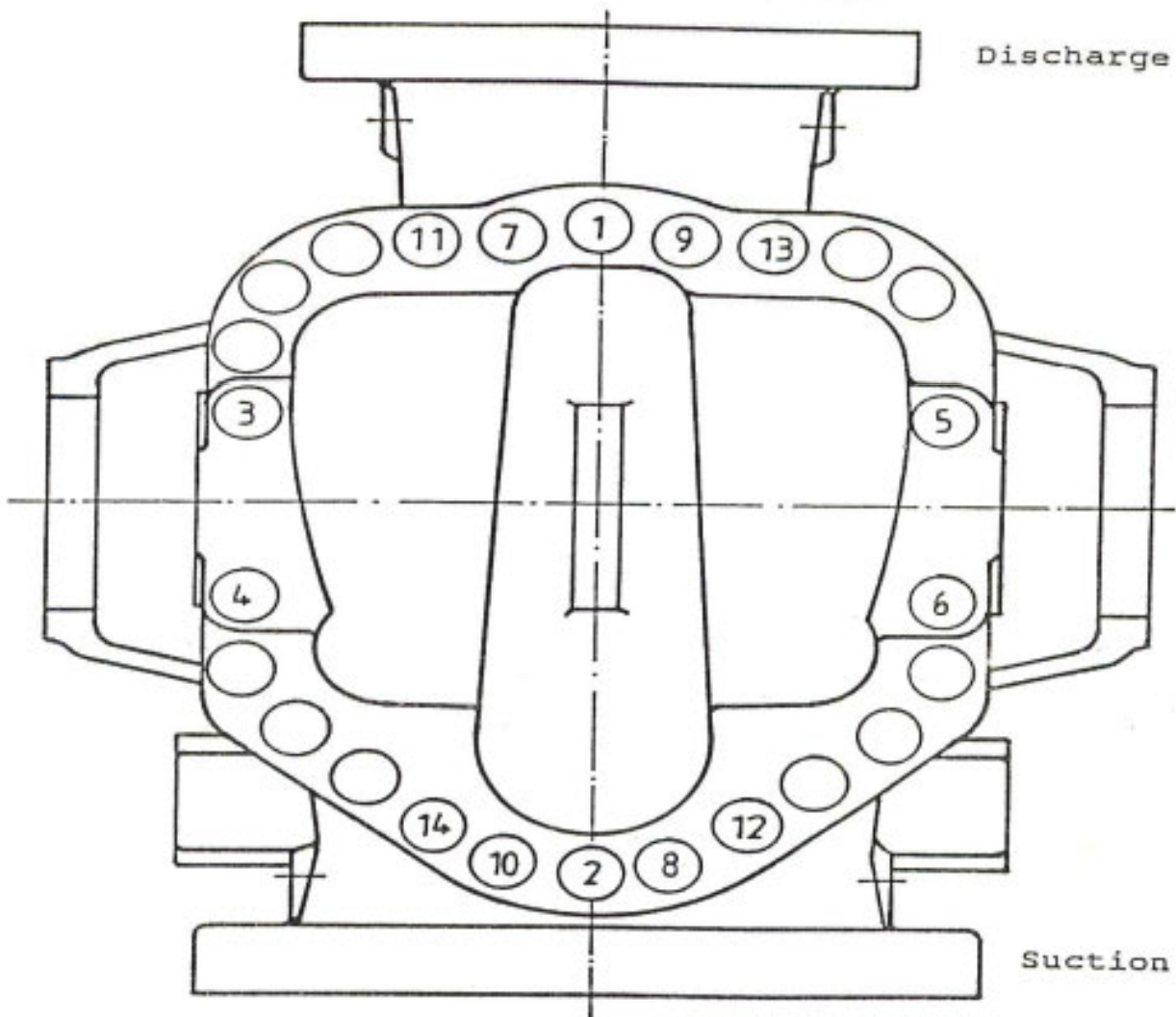
P.O.No.		 SAM TURBO INDUSTRY LIMITED				
TITLE : CROSS SECTIONAL DRAWING						
SUPPLIED THROUGH : SAM TURBO INDUSTRY LIMITED - MKD						
CUSTOMER :						
PROJECT :						
DRAWN/DR. : UN/27-5-98		CHECKED/DR. :	APPD./DR. :			
REV.No.:	0	1	2	3	4	DRAWING No.:
DATE :	27-5-98					1708-06/

Fig. 8

Instructions for Tightening the Flange Screws

Pump Type: _____

Order-No.: _____



Screws DIN 938

Tightening Torque: Nm (+-10%)

Pressure Test for the Casing: bar

When tightening the flange screws pay attention to the following:

1. Cap nuts have to be tightened manually by means of a spanner (appr. 150 Nm)
2. Then the cap nuts have to be tightened with approximately 1/5 of the full tightening torque (appr. Nm).
3. Then tighten cap nuts with the full tightening torque.

All operating steps have to be carried out precisely according to the order of tightening as indicated in numbers.

