



Specialist for Pumping Technology

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Retrofits & Rerates of Overhung Pumps

CUSTOMER'S GUIDE



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Features and Benefits

- Meets API 610 latest edition requirements.
- Seal chamber designed to allow for latest edition API 682 seal or earlier version cartridge single, double or tandem seal with external drive collar.
- Fast delivery. Short downtime as compared to a brand new pump.
- Eliminates engineering and the need to modify existing process piping or the foundation, both of which are costly and time consuming. *
- All bearing housing components are drawn from standard inventory and can be replaced within days vs. months for older outdated components.
- Improves pump reliability and reduces maintenance costs by providing a more stable rotor with lower L3/D4 ratios and more reliable bearing arrangements.
- Retrofits can be combined with a hydraulic rerate to better match the pumps BEP with customer's current operating requirements.
- Increases MTBF and reduces maintenance costs.
- Improve NPSH with the usage of an Inducer.

* Most retrofits can fit completely within the dimensional envelope of existing pumps with no changes. The possible exception to this is the modification of the coupling spacer. However, some of the older internal seal type pumps are very short and the drivers may need to be moved. Compare the overall dimensional envelope of the standard retrofit kit (see cross sectional) to be sure.



Opportunities

PRODUCT OPPORTUNITIES

All overhung process pumps of the following configurations

- Single suction
- Double suction*
- Two stage*
- High suction pressure applications*

* Check with your local Ruhrpumpen Sales Representative or nearest Ruhrpumpen Service Center for special parameters to watch for and special pricing.

APPLICATION OPPORTUNITIES

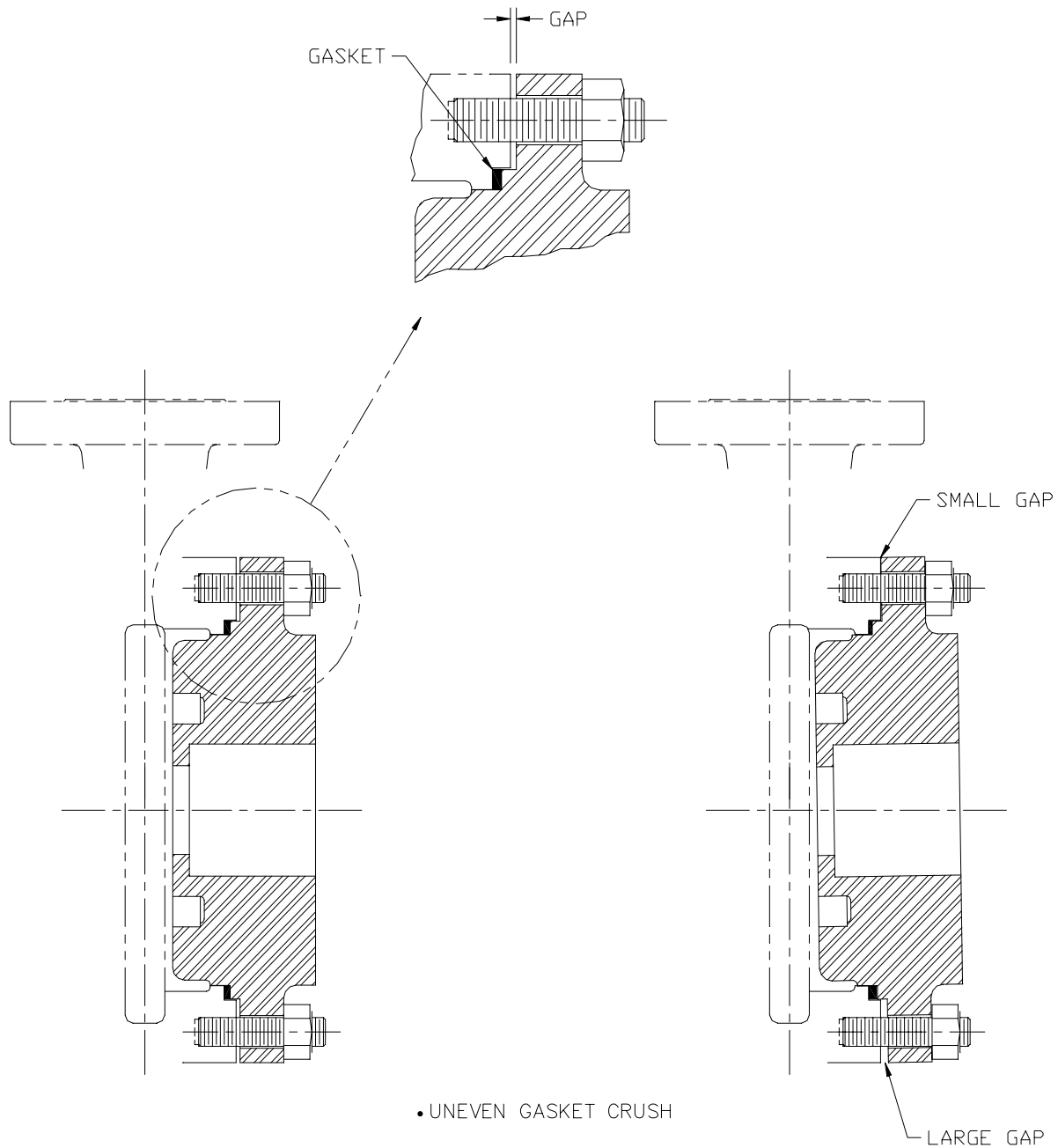
Retrofit opportunities can occur in almost any application. The situations where a retrofit is most likely to be a benefit include the following:

- Low specific gravity (low lubricity) applications where excessive seal leakage can be a problem.
- Frequent seal failures attributed to higher shaft deflection ratio which is often a problem with older API edition pumps.
- High vapor pressure applications where localized seal flashing can occur.
- Low flow (relative to BEP) applications where high radial loads can be included.
- Applications where high vibrations are present. (High vibration problems in pumps are present when inadequate designed shafts / bearings).
- Chronic bearing problems including high temperature issues can be addressed by a larger bearing housing with larger oil carrying capacity and better cooling methods.
- Old case/cover design on some competitor's pumps. (See following pages).
- Situations where cast iron bearing housings are going to be replaced. Retrofit kit is an ideal replacement option.
- Issues with fouling of cooling jackets around stuffing boxes and bearing housings. Retrofits can eliminate need for cooling water jackets in most cases.

The above applications/symptoms can often be successfully addressed though a combination of a mechanical retrofit and/or hydraulic rerate. A retrofit will provide an optimum mechanical environment for the mechanical seal and a hydraulic rerate will place the operating condition at or near the pump's BEP for maximum reliability and seal life.

Pump Case / Cover Fit

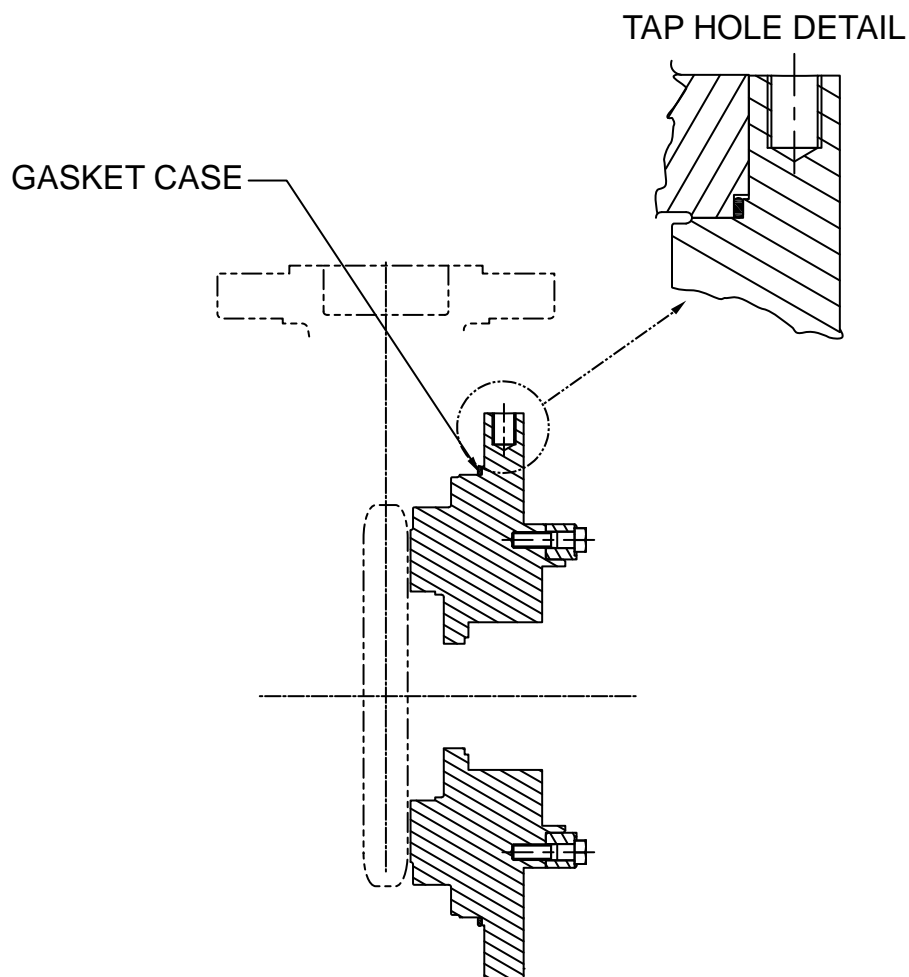
OLD DESIGN



- UNEVEN GASKET CRUSH
- POSSIBLE MISALIGNMENT
- POSSIBLE LEAKAGE

Pump Case / Cover Fit

NEW DESIGN



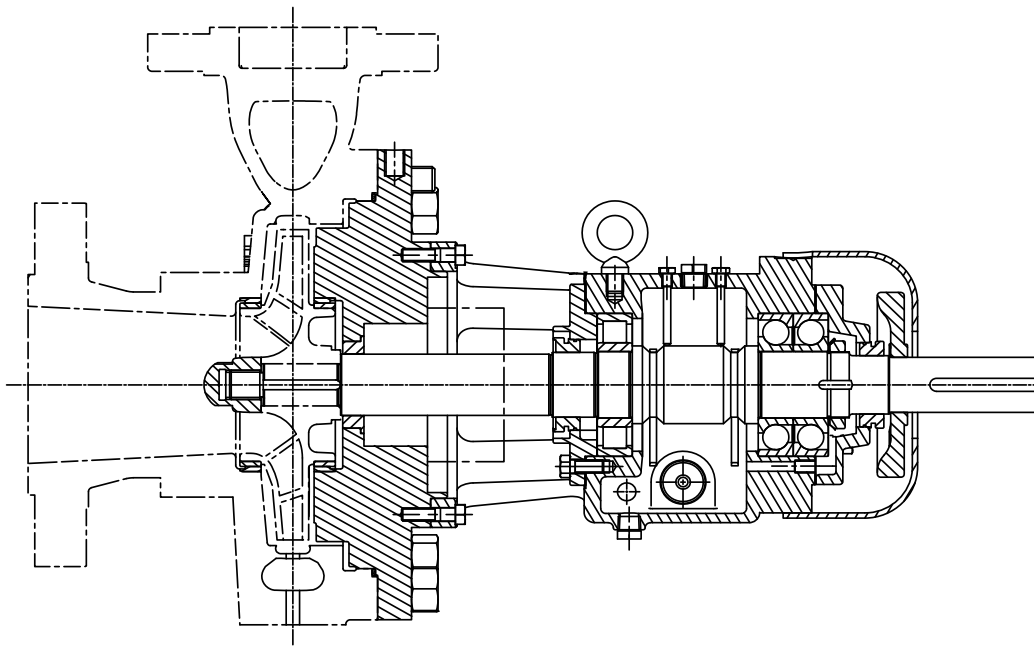
Retrofit Program

CRITICAL POINTS TO NOTE

- If Ruhrpumpen is the OEM (Original Equipment Manufacturer), have any of the original dimensions of the case or impeller been modified? Are these parts still OEM parts? If nothing has changed, only the first page of the Retrofit Data Sheets needs to be completed (page 12).
- If Ruhrpumpen is not the OEM of the pump then all the applicable information must be filled out on the Retrofit Data Sheets.
- Are there any metallurgy changes required?
- Are there any hydraulic changes required?
- Ruhrpumpen prefers to assemble kits in our shop if possible and ship to customer for installation. However, we will ship per customer's preference. Please refer to retrofit options following this page.
- Will customer provide new seal or will Ruhrpumpen be quoting them?
- Is a new seal support system required (Plan 52, etc.)?
- Does customer require Zero-emissions? In this case design to be checked by RP (Mag-Drive BU?)!
- Does customer require assistance in diagnosing existing problems?
- Does customer require assistance in installation of the Retrofitted pumps?

Standard Retrofit Workscope

OPTION A



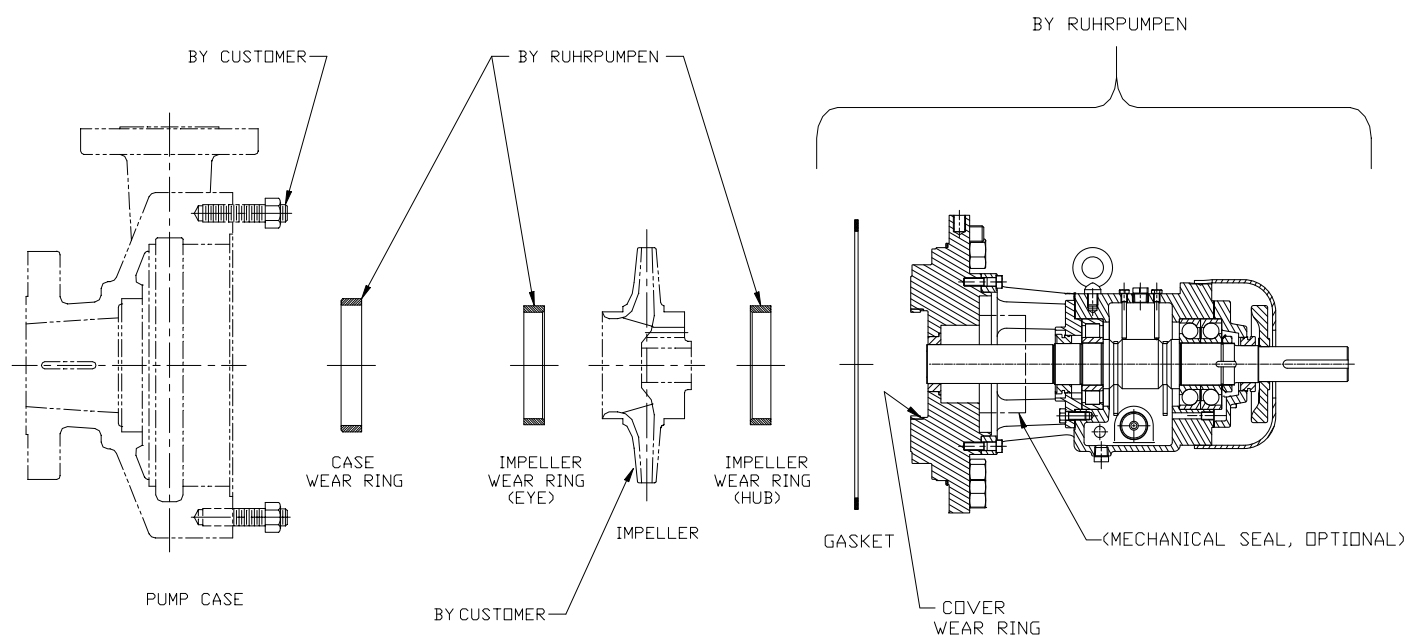
Pump is sent to Ruhrpumpen for repair. We do all of the measuring, machining & assembly. This would include:

- Disassemble, clean & inspect existing case & impeller.
- Provide as-received inspection report with digital photos as needed.
- Skim cut flanges, feet & gasket fit. Resize or polish register fit & replace case studs with new A 193 Grade B7 (zinc plated) studs & nuts.
- New pump shaft, cover & impeller nut
- New SCE bearing bracket assembly
- New wear rings
- New gasket
- Install impeller wear rings & dynamically balance impeller.
- Install mechanical seal
- Reassemble pump complete, paint & prep for shipping.
- IOM manual (includes sectional drawing & BOM)

Does not include additional case repair, coupling, coupling guard or mechanical seal.
Comments – customer gets complete pump ready to install.

Standard Retrofit Workscope

OPTION B



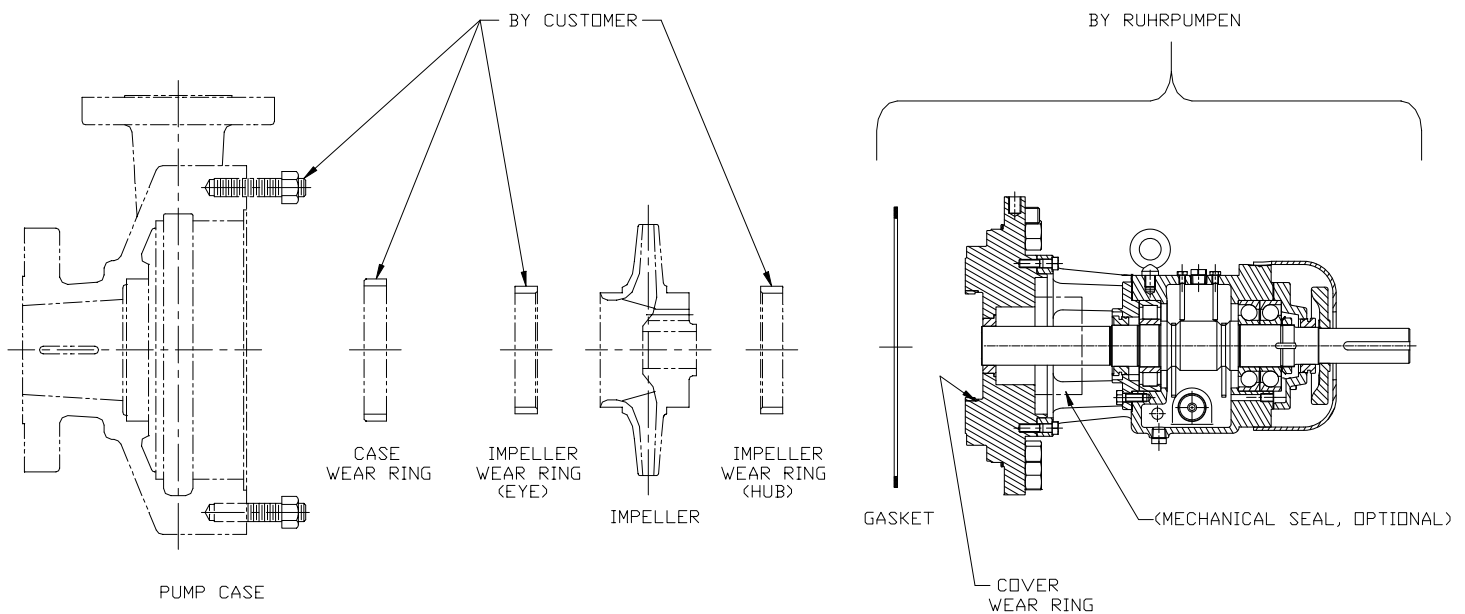
Customer to repair pump in their facility. Ruhrpumpen to provide the following:

- New pump shaft, cover & impeller nut
- New SCE bearing bracket assembly
- New wear rings
- New gasket
- Engineering sketch of pump case modifications
- IOM manual (includes sectional drawing & BOM)

Comments – customer to inspect pump case & impeller and transmit Ruhrpumpen Retrofit Data Sheet to the nearest Ruhrpumpen Service Center. Customer to repair pump case & machine to engineering sketch and assemble. Case studs & nuts furnished by customer. Customer to install wear rings and balance impeller.

Standard Retrofit Workscope

OPTION C



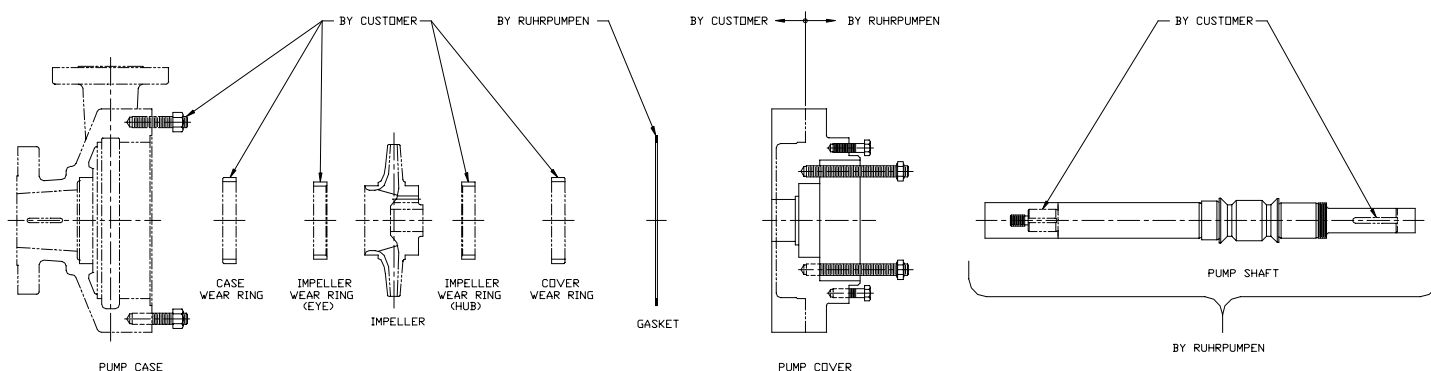
Customer to repair pump in their facility. Ruhrpumpen to provide the following:

- New pump shaft, cover & impeller nut
- New SCE bearing bracket assembly
- New gasket
- Dimensional info for wear rings
- Engineering sketch of pump case modifications
- IOM manual (includes sectional drawing & BOM)

Comments – customer to inspect pump case & impeller and transmit Ruhrpumpen Retrofit Data Sheet to the nearest Ruhrpumpen Service Center. Customer to repair pump case & machine to engineering sketch and assemble. Case studs & nuts furnished by customer. Customer to install wear rings and balance impeller.

Standard Retrofit Workscope

OPTION D



Customer to repair pump in their facility. Ruhrpumpen to provide the following:

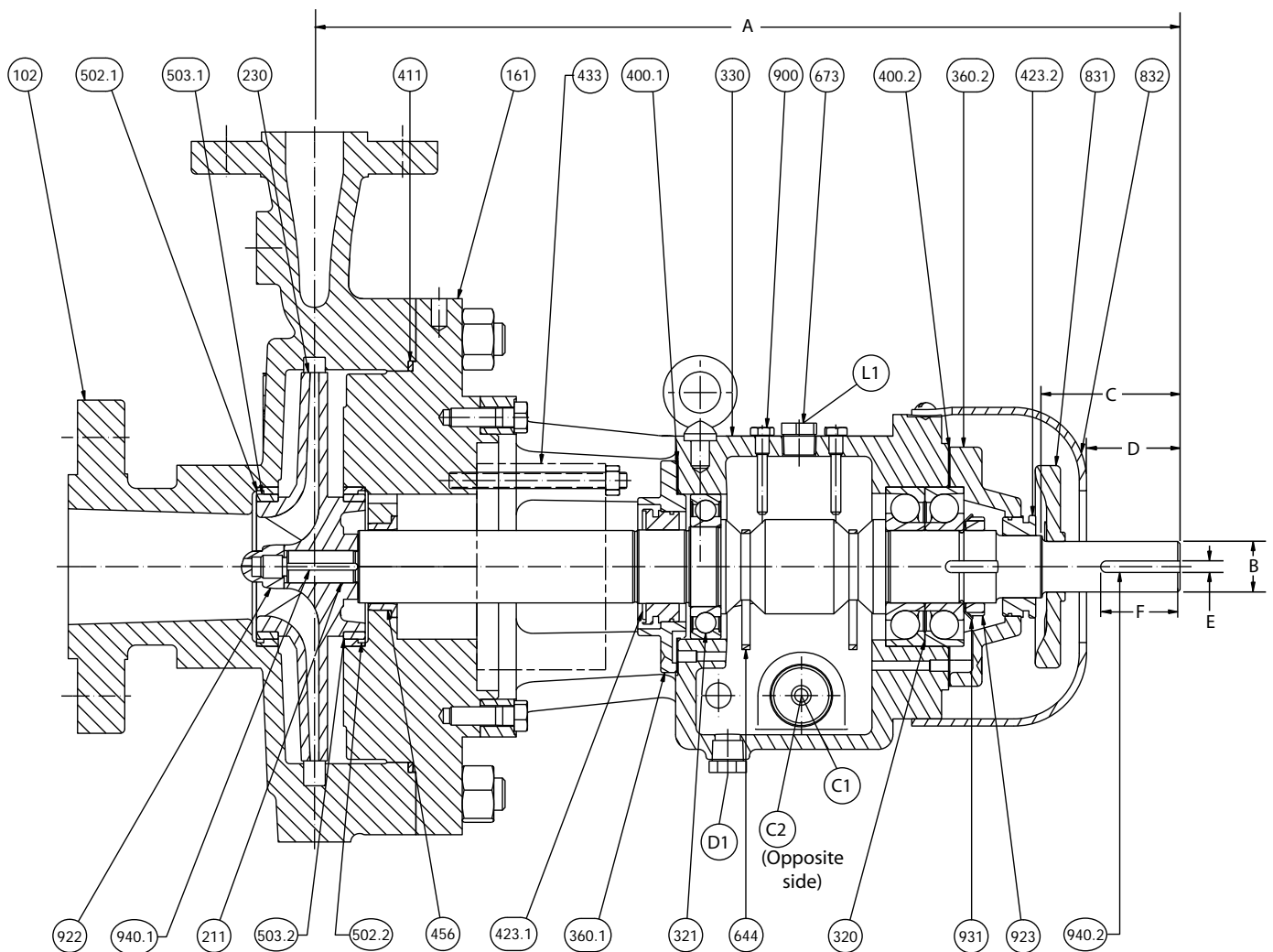
- New partly machined pump shaft left blank on either end w/o keyway or impeller nut threads
- New partly machined pump cover (seal chamber & bearing bracket fit) left oversized for customer to finish
- IOM manual (includes sectional drawing & BOM)
- New gasket

Comments – customer to inspect pump case & impeller and transmit Ruhrpumpen Retrofit Data Sheet to the nearest Ruhrpumpen Service Center. Customer to repair pump case & machine per engineering sketch and assemble. Customer to finish machining pump shaft & cover. Machining of wear rings by customer. Case studs & nuts furnished by customer. Customer to install wear rings and balance impeller.

Cross Sectional Drawing

STANDARD RETROFIT

Retrofit customization to particular application may be required.



Overhung Pumps Retrofit

SCE BRACKET DIMENSIONS

BRACKET SIZE	STANDARD DIMENSIONS (IN) (MAY BE CUSTOMIZED AS REQUIRED)			
	A	B	C	D
35	23.5	1.375	3.75	2.541
55	27.688 / 28.25	2.125	5.5	4.454
75	31.5 / 31.688 / 31.875	3	5.875	4.641
90	35.750	3.5	6.750	5.193

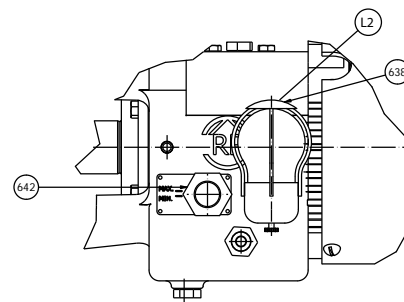
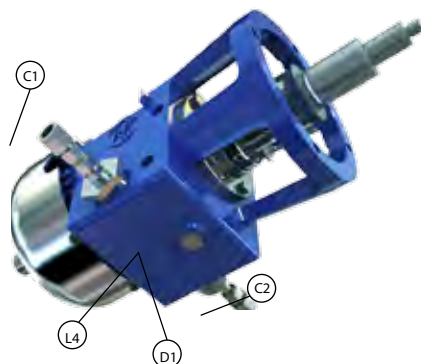
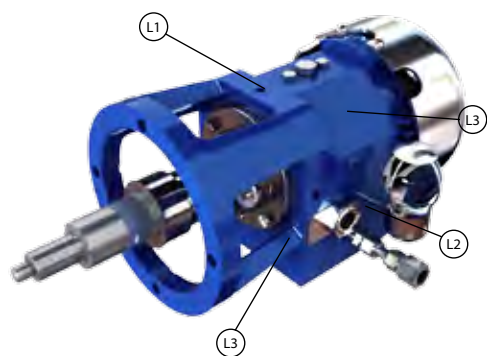
BRACKET SIZE	NAME	STANDARD DIMENSIONS (IN)		
		E		F
		WIDE	DEEP	LENGTH
35	Shaft No.1	0.313	0.1785	2
	Shaft No.2	0.313	0.1785	2
55	Shaft No.3	0.501	0.2845	3 3/4
	Shaft No.4	0.5015	0.2845	3 3/4
75	Shaft No.5	0.751	0.4275	4 1/4
	Shaft No.6	0.751	0.4275	4 1/4
	Shaft No.7	0.751	0.4275	4 1/4
90	Shaft No.8	0.876	0.4975	6

SCE BRACKET CONNECTIONS

ITEM	SIZE	DESCRIPTION	CONNECTION
C1	1.50 NPT	COOLING WATER IN	OPEN (SEE DRAWING IN PAGE 13)
C2	0.50 NPT	COOLING WATER OUT	OPEN (SEE DRAWING IN PAGE 13)
D1	0.50 NPT	DRAIN, BEARING LUBE OIL	PLUGGED
L1	0.75 NPT	FILL / VENT BEARING LUBE OIL	BREATHER INSTALLED
L2	0.25 NPT	CONSTANT LEVEL OILER	PIPED BY RUHRPUMPEN
L3	0.25 NPT	OIL MIST INLET	PLUGGED
L4	0.50 NPT	OIL MIST OUTLET	PLUGGED

PART LIST

ITEM	QTY	DESCRIPTION
102	1	Volute Casing
161	1	Casing Cover
211	1	Pump Shaft
230	1	Impeller
320	2	Anti-Friction Bearing
321	1	Radial Ball Bearing
330	1	Bearing Bracket
360.1	1	Bearing Cover
360.2	1	Bearing Cover
400.1	1	Gasket
400.2	1	Gasket
411	1	Joint Ring
423.1	1	Labyrinth Seal
423.2	1	Labyrinth Seal
433	1	Mechanical Seal
456	1	Stuffing Box Neck Bush
502.1	1	Casing Wear Ring (Eye Side)
502.2	1	Casing Wear Ring (Hub Side)
503.1	1	Impeller Ring (Eye Side)
503.2	1	Impeller Ring (Hub Side)
638	1	Constant Level Oiler
642	1	Oil Level Sight Glass
644	2	Oil Ring
673	1	Vent Filter
831	1	Fan
832	1	Fan Hood
900	2	Retainer Screw
922	1	Impeller Nut
923	1	Bearing Nut
931	1	Lockwasher
940.1	1	Key
940.2	1	Key

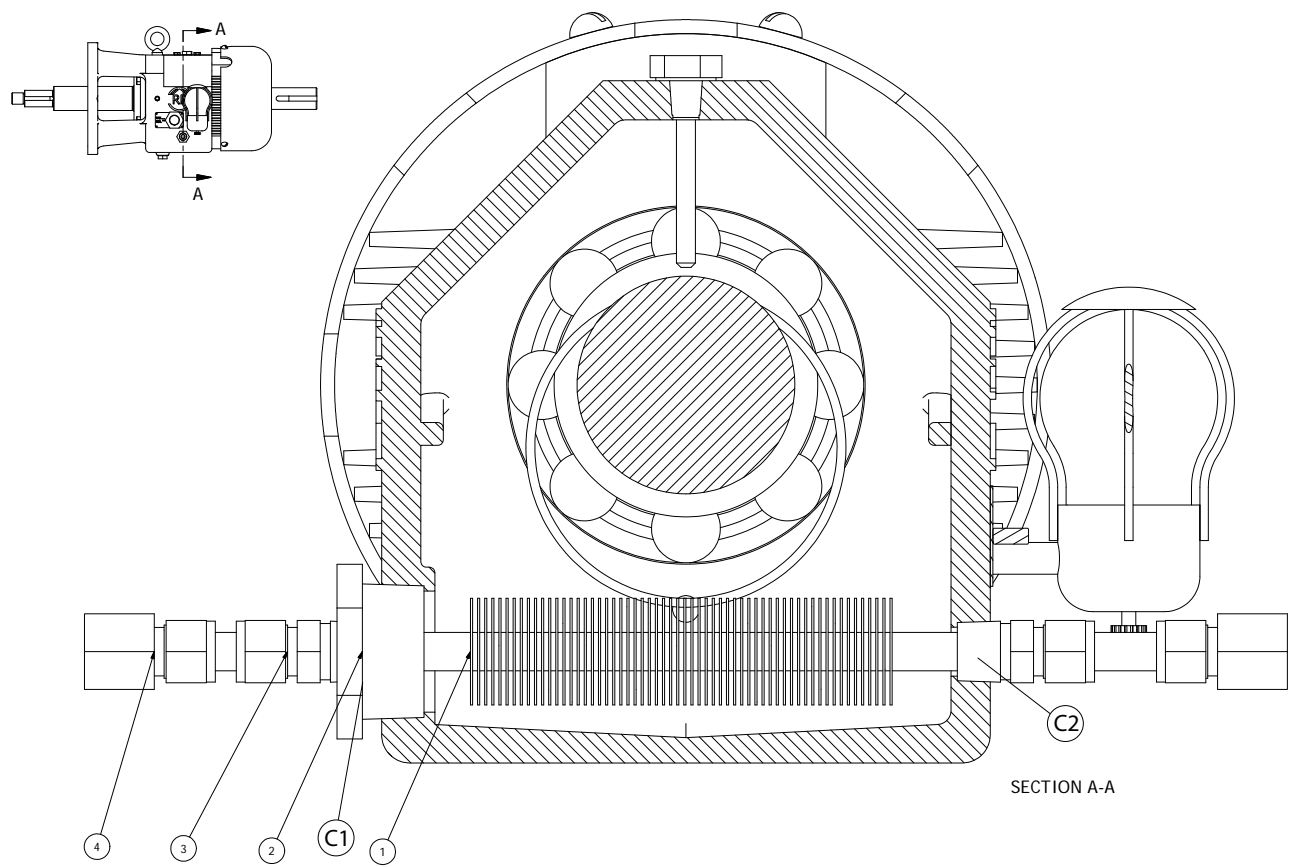


Dimensional Drawing

COOLING COIL

No dimensional changes without review and approval of Engineering.

ITEM	QTY	DESCRIPTION
1	1	COIL, COOLING 15" - 0.500 TUBING
2	1	REDUCTION BUSHING 1 1/2 - 1/2 NPT
3	2	MALE CONNECTOR 0.500 TUBING - 1/2 NPT THREAD
4	2	FEMALE CONNECTOR 0.500 TUBING - 1/2 NPT THREAD



SECTION A-A

Sizing Guide

BEARING BRACKET

Maximum bearing bracket horse power at specific speed.

Energy Density.

$P_{max} * n_{max}$

Requirement according to API 610 latest edition, Table 9 - Bearing Selection, Note c):

$P_{max} * n_{max} < 4\,000\,000 \text{ kW/min}$

BEARING SIZE	POWER P_{max}	POWER P_{max}	50 hz NMAX	$P_{MAX} * N_{MAX}$
SCE	[kW]	[HP]	[MIN -1]	[kW/min]
35	31.4	42	2 960	92 944
55	385.5	517	2 960	1 141 080
75	793.4	1064	2 960	2 348 464
90	912.0	1223	1 480	1 349 760

BEARING SIZE	POWER P_{MAX}	POWER P_{MAX}	50 HZ NMAX	$P_{MAX} * N_{MAX}$
SCE	[kW]	[HP]	[MIN -1]	[kW/min]
35	70	93.9	3 560	249 200
55	609	816.7	3 560	2 168 040
75	1000	1341	3 560	3 560 000
90	1457	1953.9	1 780	2 593 460

Notes:

P_{max} is the maximum rated power for the given bracket size.

The bearing bracket O.D. should be considered when trying to fit an existing case. The case to cover studs and associated hardware must clear the bearing bracket O.D.

35 BRACKET	55 BRACKET	75 BRACKET	90 BRACKET
9 1/4	11	14 1/2	19 3/8

Notes:

All dimensions are in inches.

Also note the overall length from the casing face to the end of the shaft. This dimension must be close to the standard overall length as shown in the cross sectional or the coupling spacer may need to be modified.



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