Q-Pumps

JEC PUMPS

Operating & Maintenance Manual

JEC JRZL Series

Rotary Lobe Pumps

ALWAYS A STEP AHEAD

Thank you for purchasing JEC Products!

This manual contains installation, operation, disassembly and assembly instructions, maintenance procedures, troubleshooting and a complete parts list for all JRZL series Rotary Lobe Pumps designed and manufactured by JEC Ltd. South Korea.

READ AND UNDERSTAND THIS MANUAL carefully to learn how to service these pumps prior to operating or servicing product and pay special attention to the warnings.
Failure to do so could result in person injury or equipment damage.

CONTENTS

ISSUE DATE: November 29, 2005 CERTIFICATE AUTHORIZATION NUMBER: 1397

THIS IS TO CERTIFY THAT

JEC Ltd.

15-26 Beodeul-ro 1362, Paltan-myun, Hwaseong-Si 445-971 , Republic of Korea

is hereby authorized to continue to apply the
3-A Symbol to the models of equipment, conforming to 3-A Sanitary Standards for:

Number 02-11
02-11 (Centrifugal and Positive Rotary Pumps)

set forth below

Rotary Lobes: JRZL105, JRZL110, JRZL115, JRZL120, JRZL220, JRZL225, JRZL330, JRZL340, JRZL440, & JRZL450; Centrifugal: JCP508, JCP510, JCP809 JCP812, JCP2210, JCP2214, JRZP015, JRZP030, JRZP060, JRZP130, & JRZP220; Centrifugal (WFI): JWP508, JWP510, JWP809 JWP812, JWP2210, & JWP2214.

VALID THROUGH: **December 31, 2016**

Timothy R. Rugh
Executive Director
3-A Sanitary Standards, Inc.

The issuance of this authorization for the use of the 3-A Symbol is based upon the voluntary authorization, by the applicant for it, that the equipment listed above complies fully with the 3-A Sanitary Standards designated. Legal responsibility for compliance is solely that of the holder of this Certificate of Authorization, and 3-A Sanitary Standards, Inc. does not warrant that the holder of an authorization at all times complies with the provisions of the said 3-A Sanitary Standard. This in no way affects the responsibility of 3-A Sanitary Standards, Inc. to take appropriate action in such cases in which evidence of nonconformance had been established.

NEXT TPV INSPECTION/REPORT DUE: **April 2017**

CERTIFICATE OF COMPLIANCE

EHEDG
EUROPEAN HYGIENIC EQUIPMENT DESIGN GROUP

TNO Certification
hereby declares that the product

JEC Rotary Lobe Pump JRZL series

From

JEC Ltd., Gunpo-City, Kyunggi-Do Korea

has been evaluated for compliance with the Hygienic Equipment Design Criteria
of the EHEDG, Document No. 8, by:

TNO Nutrition and Food Research at Zeist, Netherlands
and meets the criteria of this document as demonstrated by:

Evaluation Report No. V3864

Signed _____ Date December 31 2001
Evaluation Officer

Signed _____ Date December 31 2001
Managing Director, TNO Certification

TNO CERTIFICATION

Certificate No. C01-3710

TNO Certification BV, P.O. Box 541, 7300 AM Apeldoorn, Netherlands

Q-Pumps

ATEX Certificate

Konformitätserklärung
EC declaration of conformity

im Sinne der EG-Maschinenrichtlinie 98 / 37 / EG, Anhang IIA
as defined by EC machinery directive 98 / 37 / EC, Annex II A

Produkt: Product:	Kreiskolbenpumpe Rotary Lobe Pump
Modell: Serial No :	**JRZL series** JECP-0000
Max. Arbeitsdruck: max. working pressure:	**bis 12 bar** **to 12 bar**
Drehzahl: Speed:	**<500 min^{-1} (+/-10%)** **Ex II 2G c T4**
Kennzeichnung: Marking:	

Hiermit erklären wir, dass die Pumpentypen, mit den folgenden Richtlinien übereinstimmen:
We declares that the pump types, complies with the following relevant regulations:

EG - Maschinenrichtlinie 98 / 37 / EG, Anhang I Nr.1
EC machinery directive 98 / 37 / EG, Annex I No. 1

EG - Richtlinie 94 / 9 / EC für Geräte in explosionsgefährdeten Bereichen
EC directive 94 / 9 / EC for equipment for the use in potentially explosive atmospheres

Entsprechend Artikel 8(1)b)ii) der Richtlinie 94/9/EG ist die technische Dokumentation bei der benannten Stelle hinterlegt:
IBExU, Institut für Sicherheitstechnik, Fuchsmühlenweg 7, 09599 Freiberg

According to article 8(1)b)ii) of guide line 94 / 9 / EC the technical documentation is deposited at the nominated location:
IBExU, Institute for Safety Technology, Fuchsmuehlenweg 7, 09599 Freiberg, Germany

Angewandte harmonisierte Normen:
Applicable harmonized standards:

EN 292-1, EN 292-2, EN 809, EN 294, EN 563, EN 953

EN1127-1, EN 13463-1, EN 13463-5

Die Sicherheitshinweise der Betriebsanleitung sind zu beachten!
The safety instructions of the operating manual must be followed!

July 28 2009
Date

James Song / President

JEC LTD. 32-8, Hwadang-ri, Paltan-myun, Hwaseong-si, Gyeonggi-
Tel : 82-31-355-0316, Fax : 82-31-355-0319

1935/2004 (EC) Declaration of conformity

Producer: JEC Ltd. (15-26, Beodeul-ro 1362, Hwaseong-Si, Gyeonggi-Do, South Korea)
Product: Lotary lobe pump, Circumferential piston pump and Centrifugal pump
Model: JRZL, JRZP, JTP, JRZW, and Centrifugal pump

We, JEC, hereby guarantee that the materials are in direct contact with food as below,

SS316L, SiC seal ring, PTFE Glass filler and EPDM O-ring

Complies with the following relevant regulations:

- **1935/2004 (EC)**
- **Annex IV of Regulation (EC) 10/2011**
- **BfR Recommendation XXI**

This declaration of conformity has been established on the basis of the following:

No.	Parts	Test requested	Test done
1	Wetted parts (SS316L)	German Food, Articles of Daily use and Feed Code of September1, 2005(LFGB),Section30	Extractable heavy metals
		German Food, Articles of Daily use and Feed Code of September1, 2005(LFGB),Section31	Sensorial examination odor and taste
2	Seal ring (SiC)	German Food, Articles of Daily use and Feed Code of September1, 2005(LFGB),Section30	Extractable heavy metals
		German Food, Articles of Daily use and Feed Code of September1, 2005(LFGB),Section31	Sensorial examination odor and taste
3	Lip seal (PTFE With Glass Filler)	Commission Regulation(EC)No 10/2011 and Hence Article 3 of European Regulation No. 1935/2004	1.Overall Migration 2.Specific Migration of Heavy metal
		German Food, Articles of Daily use and Feed Code of September1, 2005(LFGB),Section31	Sensorial examination odor and taste
4	O-ring (EPDM)	BfR Recommendation XXI	1.Overall Migration 2.Specific migration of Primary Aromatic Amine 3.Lead and Zinc content 4.Specific migration of Formaledehyde 5.Organotin content
		European Commission Directive 93/11EEC	Specific migration of Nitrosamines

James Song / President

JEC LTD. 15-26 , Beodeul-ro, Paltan-myun, Hwaseong-si, Gyeonggi-do, 445-843, South Korea
Tel : 82-31-355-0316, Fax : 82-31-355-0319

EC-Declaration of conformity

(as per EC's Machinery Directive 2006/42/EC, Annex IIA)

Maufacturer
JEC LTD
15-26, Beodeul-ro 1362, Hwasung-Shi,
Kyunggi-do, South Korea

We hereby guarantee that **Lotary lobe pump (Pump Head Only)**
Type: **JRZL series**

are in conformity with the essential requirements of the EC's Machinery Directive 2006/42/CE(latest modifications included) and according the following Council Directives and harmonized norms:

- 2006/95/EC Directive "low voltage"
- UNI EN ISO 12100-2:2005

Manufacturer Declaration

(as per EC's Machinery Directive 2006/42/CE, Annex IIB)

We hereby declares that the above pumps,
Comply with the pertinent disposition, in the execution supplied by JEC LTD for the incorporation in a machine or installation, or for the assembly with other machines as a subunit of other higher order machine. Harmonized norms used, particularly:

UNI EN ISO 12100-2:2005

The machine above must not be put into service until the machinery into which it has been incorporated have been declared in conformity with the EC Machinery Directive. It must meet, particularly, the standards ISO 23857:2008, ISO 13732-1:2007 in its respective current editions.

James Song / President

JEC LTD. 15-26 , Beodeul-ro, Paltan-myun, Hwaseong-si, Gyeonggi-do, 445-843, South Korea
Tel : 82-31-355-0316, Fax : 82-31-355-0319

WARRANTY

Terms, Warranty Provisions, Notice of Claims and Limitation of Liability

All terms & conditions and prices of sale are based on the applicable JEC price list at the time an order from Customer is received by JEC and are subject to change without notice. No assignment of the purchaser's rights may be made without consent of JEC.

JEC warrants its Product from defects in materials and workmanship for a period of one (1) year from the shipment date, providing it has been used as recommended and in accordance with recognized piping practice, and providing it has not been worn out due to severe service, normal tea and wear or subjected to accident, misuse or improper maintenance. This warranty extends only to the original Buyer.

This warranty is expressly in lieu of any other warranties expressed or implied, including but not limited to any implied warranty of merchantability or fitness for a particular purpose.
All claims must be in writing and must be mailed or delivered by purchaser within thirty (30) days after purchaser learns of the facts upon which such claim is based. Any claim not made in writing and within the time period specified above shall be deemed waived.

Purchaser's sole and exclusive remedy and JEC Ltd.'s maximum liability for claims arising hereunder or for negligence for any and all losses and damages resulting from any cause shall be either the repair or replacement of defective components or pumps verified by JEC.
In no event, including in the case of a claim for negligence, shall JEC Ltd. be liable for incidental or consequential damages including loss of profits.

No person, including any representative, employee or agent of JEC, is authorized to assume on behalf of JEC, any liability or responsibility in addition to or different from that described in this provision. Any and all representations, promises, warranties or statements that are in addition to or different from the terms of this provision are of no force or effects.

RECEIVING INSPECTION

Ports are rubber capped at the factory to keep out foreign objects. If covers are missing or damaged, a thorough inspection of fluid head, by removing pump cover, is recommended. Be sure pumping head is clean and free of foreign material before rotating shaft.

LOSS OR DAMAGE

If your pump has been lost or damaged in transit, immediately file a claim at once with the delivering carrier and ask for an Inspector to call. The carrier has signed the Bill of Lading acknowledging that the shipment has been received from us in good condition.
We will of course assist you in every way in collecting claims for loss, or damage, however, we are not responsible for the collection of claims or replacement of material.

SAFETY

DO'S & DON'TS

DO read and understand these instructions before installing or using the pump.
DO use JEC spare parts when replacing a component of the pump.
DO NOT services the pump while it is running.
DO NOT place the pump in an application where the service ratings are exceeded.
DO NOT modifies the pump. Modifying the pump creates unsafe conditions and voids all warranties.

SAFETY PRECAUTIONS WHEN INSTALLING PUMP

DO use an authorized electrician when connecting the pump.
DO observe the mechanical limits of the pump (refer to the pump performance sheet).
DO install a throttling valve in the discharge line.
DO NOT installs a throttling valve in the suction line.

SAFETY PRECAUTIONS WHEN OPERATING PUMP

DO only qualified personnel should operate this pump.
DO NOT start the pump until all personnel are clear.
DO NOT touches the pump or the lines when pumping hot fluids or when performing Clean In Place (CIP) procedures.
DO NOT run the pump with BOTH the suction inlet and discharge outlet blocked. Running the pump with the inlet the blocked will cause serious damage to the pump.
DO NOT checks pump rotation with liquid in the pump.
DO NOT runs the pump with the front cover removed. The rotors and rotor case could be damaged or may cause severe injury.
DO NOT operates the pump with removed the safety guard or shroud.

SAFATY PRECAUTIONS WHEN SERVICING PUMP

DO ensure the pump is cool to touch before performing service.
DO relieve all pressure and drain all fluids from pump and connected piping before performing service.
DO ENSURE POWER TO THE UNIT HAS BEEN UNPLUGGED PRIOR TO PERFORMING ANY PUMP MAINTENANCE OR CLEANING.
DO exercise caution and wear protective clothing when using lye or acid for cleaning.

INSTALLATION

1. Mounting surface should be flat and level.
2. The suction line should be kept as short as possible and present minimum friction loss.
3. Suction and discharge lines must be fully supported and installed so that no expansion or shock forces act on the pump which could lead to distortion.
4. Ensure sufficient clearance around the motor and pump.

START UP

1. Before connecting the suction and discharge pipe work the entire system must be thoroughly cleaned to prevent damage from welding, grinding and other residues.
2. Before starting, bump the motor to check if the motor fan is rotating clockwise when seen from the motor back. If the motor fan cannot be seen, look through the pump case adaptor after takeoff motor shroud. (Bump means to momentarily apply power to the motor and then immediately remove power).
3. Direction of rotating must only be checked with a completely filed system. Where double mechanical shaft seals are installed the flush supply must be operational. Any dry running will result in seal damage.
4. The motor rating plate should be checked to ensure that it is in accordance with the available electrical supply. It is essential that the full load current is not exceeded to prevent motor overload.
5. Before start up any safety guards required by local statutory regulations should be fitted.

Pay attention to circumstances that could indicate pump cavitation;

1. Low pressure in the suction line due to bad suction conditions.
2. Air in the suction inlet line.
3. Pumping temperature is too high.
4. Pump is oversized.

TROUBLESHOOTING

Problem	Cause	Solution
Pump not turning	Interruption of electrical power. Key sheared or missing. Coupler or belts are not connected. Pump shaft or gears sheared. Wrong rotation. Relief valve not properly adjusted.	Reset circuit breaker, check fuses. Replace. Replace or adjust. Replace. Reverse. Adjust valve.
Pump not priming	Valve closed in suction lines. Suction line clogged or restricted. Air leak in connections or seal. Pump speed too slow. Suction line does not remain flooded. Air lock. Excessive clearances in pump. Net inlet pressure low.	Open valve. Clear suction line. Repair leak. Increase sped. Install foot valve. Bleed suction line. Replace out of tolerance parts Increase suction pressure
Insufficient flow	Speed too low. Air leak.	Adjust speed as required. Repair leak.
Noisy operation	Cavitation. Viscous product. High vapor pressure, high temp. Leaks in piping or pump. Dissolved gas in product. Mechanical noise. Excessive weight from piping, Pump body distorted. Excessive discharge pressure. Worn bearing. Worn gears. Rotor-to-rotor contact.	Increase net inlet pressure. Slow pump, reduce product. Reduce temperature. Repair leaks. Reduce discharge pressure. Check tolerances. Support piping. Check align and level Reduce discharge pressure. Replace bearing. Replace gears Time rotors, replace twisted shafts, replace worn gears.
Pump overloads	Viscosity of product higher than expected. Higher pressure than expected.	Reduce pump speed, increase piping size, Reduce pump speed, increase pipe size,
Play between gears	Worn gear teeth. Gear loose on shaft.	Replace gear. Inspect gear key, keyway and shaft. If all are undamaged, retighten the gear retaining nut. Check for backlash.

If assistance is required, please contact your local sales office with the following information:

1. Operating conditions.
2. Accurate description of default.
3. Model of pump and serial number.
4. If possible installations sketch of pump system.

MAINTENANCE

ROTOR CASE DISASSEMBLY

Prior to removal of pump, the shut-off valves in the suction and discharge pipe work must be closed. If there is any risk that product may be hardened, crystallized or frozen in the pump it should be thoroughly drained and cleaned immediately after use. Similar attention must be applied to the seal flushing system. Remove power before servicing to prevent from any unintended start of the pump by an authorized electrician.

Reference numbers are listed in the 'PARTS LIST' refer to the exploded view on pages 26-30.

Start by removing the front cover after removing the cap nuts using the appropriate wrench from the cover. During this process, place all parts on a clean, protected surface with finished surfaces and seal faces facing up. If it is stuck, tap the cover off using a soft mallet.
And then, remove the cover O-ring and inspect.

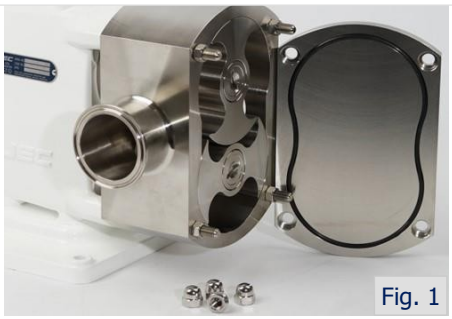


Fig. 1

Remove rotor bolts using the special tool supplied with pump or appropriate size wrench. To remove rotor bolts, place the plastic bar between rotors to keep the rotors from moving as shown in Figure 2.
Turn in the drive rotor bolt to the counter-clockwise direction and extract rotor bolts and spring washers.


Fig. 2

Rotors can be removed from rotor case by pulling straight.
It is important to be cautious with the rotors so that they are not damaged.


Fig. 3

Remove hexa-nuts on the four stud bolts securing the rotor case to the gearbox.


Fig. 4

After pulling out both rotors, rotor case can be separated by sliding along the stud bolt and pulling out from the gear box. Inspect the rotor case for wear, clean and continue to seal maintenance, if needed.


Fig. 5

In this time, handle and place carefully to keep the right track of position of the top & bottom shim(s) which shafts are associated with, to avoid lost, damaged or misalignment They are installed accordingly at the factory for that particular body.

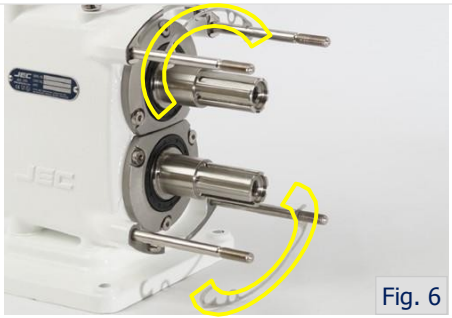


Fig. 6

If it is stuck tight, tap alternately on the back of the inlet and outlet ports using soft mallet as shown in Figure 7.


Fig. 7

INSPECTION

While performing standard maintenance or cleaning, check for signs of damage or extreme wear. A simple inspection may show signs of a problem long before it becomes serious. Detection of such problems can avoid costly repairs and reduce down time.

1. Inspect O-rings and seals for re-use. Worn O-rings and seals should be replaced.
2. Inspect seal faces for chipping, scratches or cracks. Replace any seal faces if damaged.
3. Inspect shaft shoulder matched to rotors and other metal parts worn or damaged.
4. Inspect rotor galling sign among the rotor case, front cover and rotors. It must be removed or replaced.
5. Inspect bur of the rotor bolt groove. It must be removed or replaced.

SEAL MAINTENANCE

JRZL series is designed by 'Front Loading Seal' that the mechanical seal system can be changed or replaced without removing rotor case.
Check & inspect all components of seal replacement kit carefully whether there is any damage or defect before installing. If any chipping, crack or scratch found during inspection, do not reuse them and replace the damaged one.

Below shows the Single mechanical seal (Figure 8), Double mechanical seal (Figure 9) and PTFE Triple lip seal (Figure 10).


Fig. 8


Fig. 9

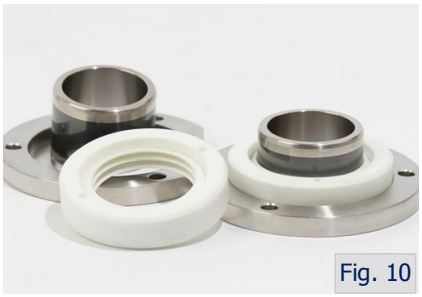


Fig. 10

If replacement for the seal ring only required, you can easily dismantle and pull it off from rotor case just after removing rotors without dismantling for the rotor case thanks to 'Front loading seal design'. And put the new one and push into rotor case.

The seal ring can be easily removed from rotor by using a small screw driver ( ) or pin as shown in Figure 11. This is common for the Single mechanical and Double mechanical seal.
Put rotor face down on the table and pull out the seal ring from rotor.


Fig. 11

Put the replacing NEW seal ring on the rotor and push downward and inserted into the rotor in Figure 12.


Fig. 12

Single Mechanical Seal Maintenance

Remove the Seal ring from the rotor case & rotor (shown in Figure 13) and inspect them. If any seal is damaged, do not re-use and replace it.
Clean both shaft ends and the rotor case before assembling. Push the replacing NEW Seal ring into the rotor case O-ring and turn fit into the seal pins on the seal body after Rotor Case Assembly on page 16.


Fig. 13

Place the rotor case face down on the table and loosening the wrench bolts and washers using appropriate wrench.

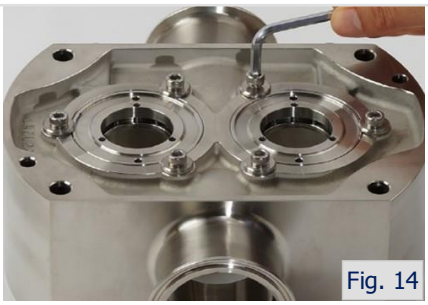


Fig. 14

Pull out the single mechanical seal bases out of the rotor case.
Insert the replacing NEW seal body into the rotor case and tighten the wrench bolts and washers.
And see 'Rotor Case Assembly' on page 16 to continue.


Fig. 15

Double Mechanical Seal Maintenance

Remove the Seal ring from the rotor case & rotor (shown in Figure 16) and inspect them. If any seal is damaged, do not re-use and replace it.
Clean both shaft ends and the rotor case before assembling. Slide and insert the replacing NEW seal ring into the rotor case after Rotor Case Assembly on page 16.


Fig. 16

After rotor case removed (Figure 5), pull out and remove the Double seal rotating part from the shaft and inspect them. If any Double seal rotating part, Seal face and O-ring is damaged do not re-use and replace it.
Clean both shaft ends and the rotor case before assembling. Lubricate the replacing NEW Double seal rotating part O-ring and install it in the Double seal rotating part. Slide and insert the Double seal rotating part on the shaft making sure to line the slot on the Double seal rotating part to the pin in the shaft.


Fig. 17

Place the rotor case face down on the table and pull out carefully the Double seal body out of rotor case by hands shown in Figure 18.
Lubricate the replacing double seal body or O-ring and insert it into the rotor case and fit into the Seal pin properly.
See 'Rotor Case Assembly' on page 16 to continue.


Fig. 18

Triple Lip Seal Maintenance

After remove rotor case (Figure 5), pull out and remove Ceramic coated sleeves from the shaft and inspect them. If any of them is damaged do not re-use and replace it.
Clean both shaft ends and the rotor case before assembling. Slide & insert the sleeves onto the shafts until it seats on the shaft shoulder. Align the slot in the shaft sleeve to the drive pin on the shaft.


Fig. 19

Place the rotor case face down on the table and loosening the wrench bolts and washers using appropriate wrench as shown in Figure 20.

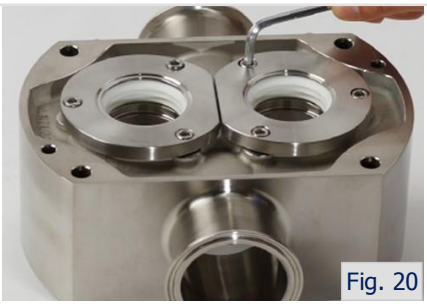


Fig. 20

Pull the Lip seal out of the rotor case.
And insert the replacing NEW Lip seal, making sure the holes in the seal to be lined up with the pins in the rotor case. Recap and tighten the Lip seal gland with wrench bolts.
See 'Rotor Case Assembly' on page 16 to continue.

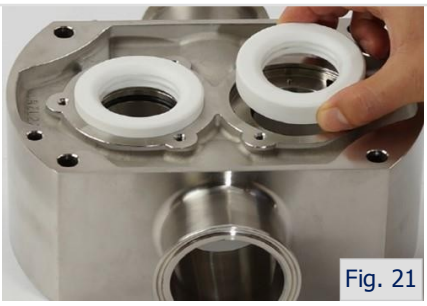


Fig. 21

During the assembly the rotor case to the gear box, Lip seal caused the tight insert to the rotor case. In this case, tap rotor case using soft mallet or fasten the Stud nut can make it easier to insert for assembly between the rotor case to the gear box.

ROTOR CASE ASSEMBLY

Before installing the rotor case (31) to the gearbox (1A), make sure to clean the surface of rotor case and gear box and check the shim plates surely between rotor case and gear box as originally.

Assemble the rotor case (31) onto the gear box (1A) and secure the four hexa-nuts (46) with reference of below torque set value.

Series	ZL100	ZL200	ZL300	ZL400	ZL500
Bolt size	M8	M10	M14	M20	M20
Torque (N·m)	30	34	80	120	120


Fig. 22

Assemble rotors onto the shaft, engaging the shallow groove with short spline in rotor and seal side first in to the shaft.

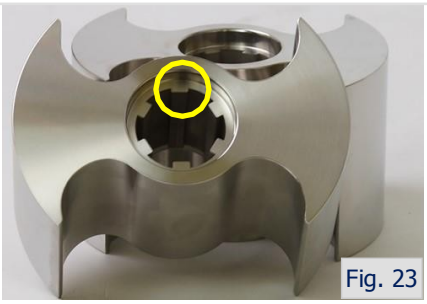


Fig. 23

Place the plastic bar between the rotors as shown in Figure 24. Tighten the first rotor bolt with a special tool to the below recommended torque.

Series	ZL100	ZL200	ZL300	ZL400	ZL500
Bolt size	M8	M14	M18	M18	M18
Torque (N·m)	17	35	48	56	56


Fig. 24

To tighten the second rotor, place the plastic bar on the opposite side of the rotor and tighten the second rotor bolt to the proper torque.

Be sure not to make any bur on the rotor bolt groove during this process. It may cause the serious problem such as galling on the rotor case and if it happened, it must be removed.

Install the new O-ring inside of the cover (32) and slide the cover over the stud. Thread cap nuts (33) on the studs and tighten using an appropriate wrench with reference of below torque set value in an opposing manner shown in Figure 25.

Series	ZL100	ZL200	ZL300	ZL400	ZL500
Bolt size	M8	M10	M14	M20	M20
Torque (N·m)	14	17	30	52	52

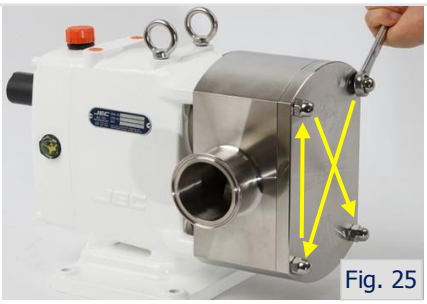


Fig. 25

Use feeler gauges and depth micrometer to verify the back and radial clearances between the rotors and the rotor case. A depth micrometer should be used to verify the front clearance.

ROTOR CLEARANCE

Rotor clearance must be precisely maintained to provide maximum pumping efficiency, yet prevent contact between rotors, rotor case, and front cover during operation.
If pumping efficiency is lower than expected or if parts contact has occurred during operation (Within rated differential pressure), check the rotor clearances and adjust, ifincorrect.

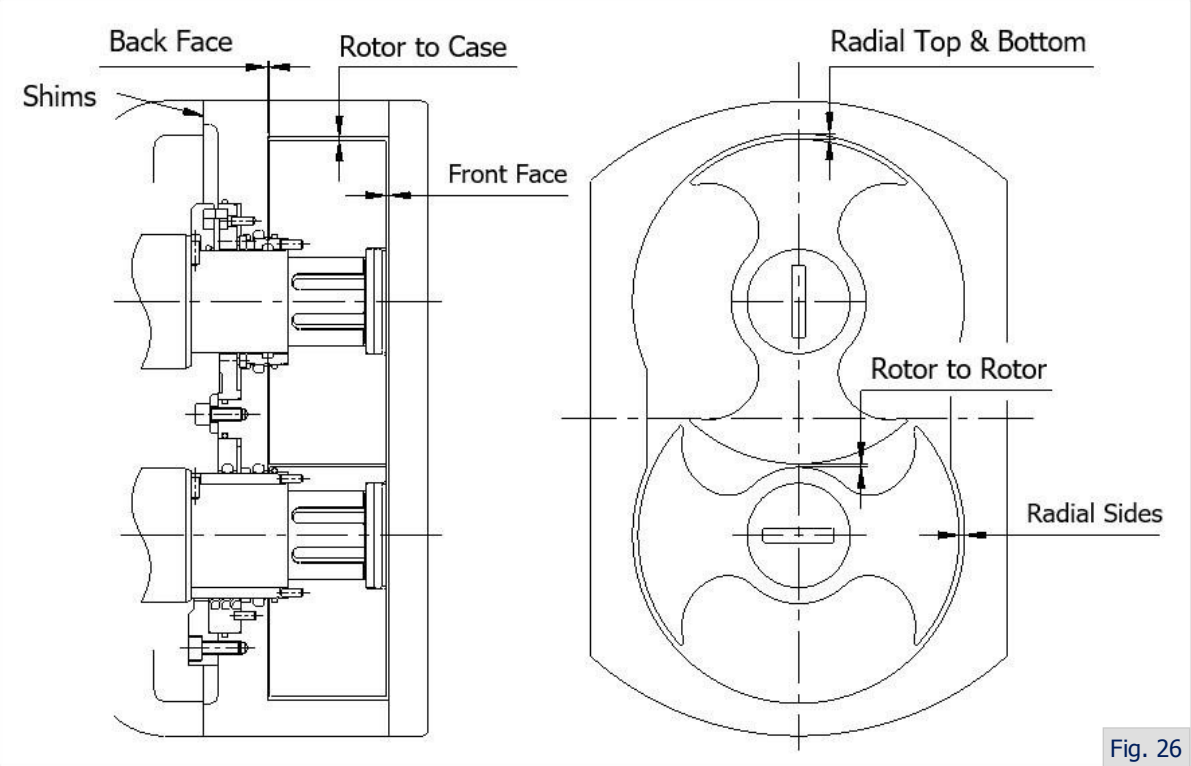


Fig. 26

Standard Rotor Clearances (mm)					
Model	Back Face	Front Face	Radial Sides	Radial Top & Bottom	Rotor to Rotor
ZL105-002-20	0.05	0.05	0.07	0.07	0.1
ZL110-005-20	0.05	0.05	0.07	0.07	0.1
ZL115-012-12	0.15	0.15	0.27	0.12	0.15
ZL120-021-08	0.15	0.15	0.3	0.15	0.15
ZL220-040-12	0.2	0.2	0.3	0.15	0.2
ZL225-062-08	0.2	0.2	0.4	0.2	0.2
ZL330-102-12	0.3	0.3	0.4	0.2	0.3
ZL340-144-08	0.3	0.3	0.5	0.3	0.3
ZL440-227-12	0.45	0.45	0.55	0.3	0.4
ZL450-334-08	0.45	0.45	0.7	0.45	0.4

There are two areas of rotor clearances as illustrated following:

- Rotor tip clearance; not adjustable set by manufacturer
- Front and back face clearance; adjustable by shim

Rotor thickness and body depth are fixed at manufacturer. Therefore, with the correct rotor size selected, the only maintenance adjustment that can be made is the proportion of front and rear clearance. Measure the front clearance as follows:

1. The rotor to rotor housing back face clearance is maintained by the shim(s) (45).
2. Check that the rotor case is tight to the gearbox (1A). And check the rotor bolts (35) are tight.
3. Measure the clearance between the back face of the rotor case and the back of the rotor with a feeler gauge with reference of the above recommended back face clearance.
4. If incorrect, adjust by adding or removing shim(s) (45) from behind the rotor case.
5. Check each rotor and adjust as necessary.

ROTOR TIMING

Rotor timing is critical for the pump operation and must be precisely maintained to provide maximum pumping efficiency, yet prevent contact between rotors during operation. If pumping efficiency is below expectations, or if rotors contact during operation (within rated differential pressure), check rotor timing and adjust if incorrect. Also check rotor timing after any gearbox dismantling when the gears are removed and/or replaced.

Check Rotor timing as follows:

1. Assemble each rotor in its normal location on the drive shaft and the idle shaft. Assemble each rotor bolt and tighten hand tight.
2. Rotate the shafts 30 degrees and measure gap as illustrated by arrows in Figure 27. Rotate the shafts 60 degrees to the opposite direction and measure the gap as illustrated.
3. The Rotors are correctly timed when the gap measured at both locations are equal. If the gap is unequal, adjust the timing as follows.
4. Rotor timing is determined by the relative location of the two helical gears (14) on the shafts. Gear spacers (17) are used to adjust the location and the timing. When adjusting timing, move only one of the two gears.

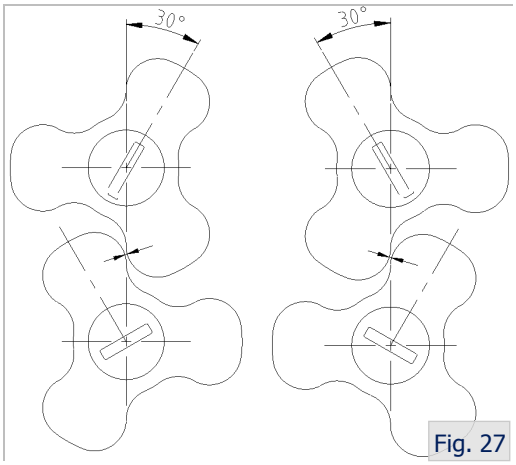


Fig. 27

5. Bend away the tab of the lock washer (12) on drive shaft, loosen the lock nut and remove gear. Insert a NEW gear spacer(6mm) on drive shaft, gear, lock nut and lock washer consequently and tighten referring the 'Gear Box Assembly' in page 19. Finally, adjust the rotor timing to be correct.

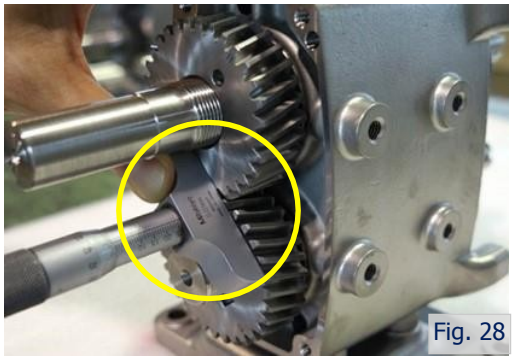


Fig. 28

6. If the rotor timing is correct, measure the gap of the gear between drive shaft and idle shaft using depth micrometer shown in Figure 28. Adjust the gap using spacer and shim(s) according to the below cases.

   * If the gap is (**+**) value (idle shaft is more embossed than drive shaft) as shown in Figure 29, combined 6mm spacer & shim(s) and add on the idle shaft to make the gap equal.

   * If the gap is (**-**) value (drive shaft is more embossed than idle shaft) as shown in Figure 30, combined 5mm spacer & shim(s) and add on the idle shaft to make the gap equal.

   Above cases of combinations (5mm & 6mm spacer, 0.1mm shim(s)) can be applied for ZL100 & 200 series only. While the other bigger size of shim(s) & spacer combination, but same concept, can be applied for ZL300 & 400 series.

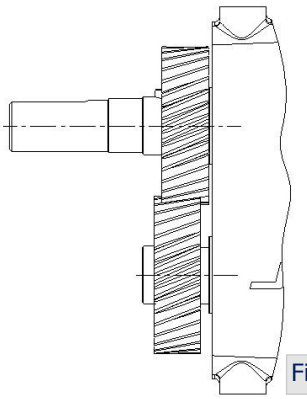


Fig. 29

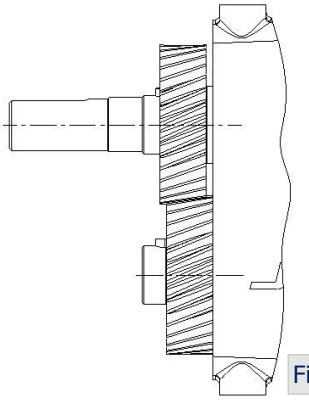


Fig. 30

7. Reassemble the idle shaft by the same procedure as drive shaft after adjustment.

GEARBOX MAINTENANCE

Gearbox Disassembly

1. Remove the drain plug and drain the oil.
   Remove the shaft key (7) on the drive shaft and gear box cover bolts (6) from the rear cover (4).
2. Pull the cover off the drive shaft extension. If the cover stuck, use a soft mallet carefully to loosen it. Heavy hitting by mallet may be caused damage to the cover and dowel (15).

   Remove the rear cover oil seal (11) from the rear cover if the oil seal is needed to be replaced. Remove the paper gasket from the cover or gear box

Fig. 31

3. Straighten the locking tab of the bearing lock washer. Remove the lock nut (12-1) and lock nut washer (12) from the drive shaft (8) & idle shaft (9).
4. Pull the two helical-gears (14) off from the drive shaft (8) & idle shaft (9).

Fig. 32

5. Remove the gear keys (10) for both drive & idle shafts.

Fig. 33

6. Remove the front bearing gland set bolts (23) as shown in Figure 34.
7. Place the gearbox (1), wet end (rotor side) down, on the arbor press.

   Protect the shaft ends with a wooden block and press the drive & idle shafts to pull out of the gearbox.

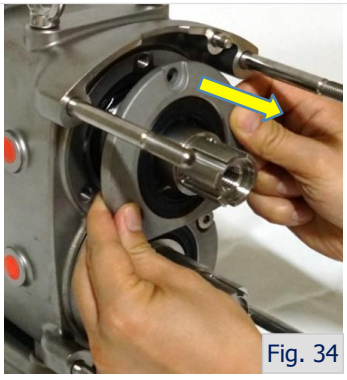


Fig. 34

8. Or pull out the drive & idle shafts by hitting with soft mallet the rear-end of each shaft on the gasket face of the gear box.

Fig. 35

9. Remove the bearings and spacers (16) together from the shafts by pressing the shaft separated with them. Or remove bearings by puller shown in Figure 36.

Fig. 36

10. The taper roller bearings for ZL400 series must be kept together with in-outside spacer and separated for drive & idle shafts.

Fig. 37

Gearbox Assembly

1. Clean and lubricate the front & rear bearing areas of the drive & idle shafts with oil.

   Fit the front bearing, spacer and rear bearing on the shaft sequentially by arbor press (or heat 120□(250F) up by heater).

   Position the gearbox (1) with wet end side facing up and be sure to place carefully for the gasket face(downside) of cover during this time.

   Clean and lubricate the front and rear bearing areas with oil.

   Insert the shaft perpendicularly one by one to the gearbox properly. There should be a tight sliding fit between the gearbox and the bearing outer rings. Press the shaft into gear case until bearings are fully seated.


Fig. 38

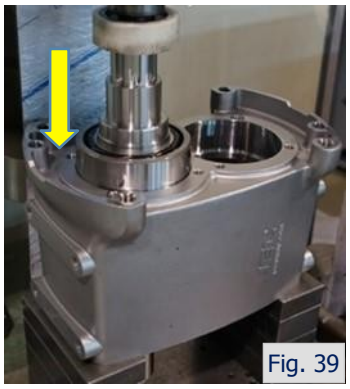


Fig. 39

2. Lubricate and install the front bearing oil seals set (21,22,24 into the bearing gland) on the gear box.

   Place the front bearing gland set on the both rotors and insert carefully for the Oil seal spring inside of the gland set would not be deflected during insert. Set the Bolt & washer, and tighten.


Fig. 40

3. Place the gear spacer (16) over the shafts.

   Clean and lubricate the gear area of the shaft and the face of the lock washer with oil.

   Align both shafts so that the gear keys (10) slots are on to the 12 o'clock position shown in Figure 41.

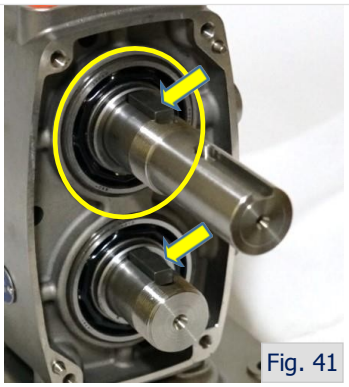


Fig. 41

4. Place the gear, lock washer (12) and lock nut (12-1) sequentially onto the shafts and hand tighten.

   In order to ensure proper rotor timing the gears must be installed along with the rotors. Slide the gears on the shafts aligning the slot on the gear with the gear key


Fig. 42

5. After the gears are installed, turn the shafts to make sure they turn freely and that the rotors (38) are timed correctly. (Rotor alignments are required)

   See Page 18 'Rotor timing' for reference.


Fig. 43

6. Use a spanner wrench to tighten the gear lock nut on the drive shaft. You can install the rotors to hold the shafts in place while you tighten the nut.

   Tighten the locknut (12) on the idle shaft, following the previous steps.

   Lubricate and install the rear oil seal cover (11) into gear box (1).


Fig. 44

7. Install the paper gasket (26) to the gasket face of the gear box and mount the rear cover assembly over the drive shaft extension onto the gearbox.
8. Set the cover bolts & oil window and fill the oil to the oil reservoir up to the middle range of the oil window. See the next page 'Lubrication' in detail.
9. Set the pressure relief valve.

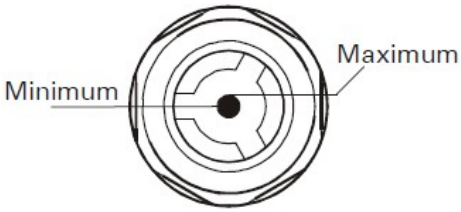
Lubrication

Pump bearings and gear should run in an oil bath. Replacement of these bearings and gear wheels is recommended after 20,000 hours of operation.
However, the shorter change intervals required for particularly difficult operating conditions, such as:

- High temperature variations
- High pressure fluctuations

Oil in gear box is recommended to be changed once a year or every 3,000 operating hours.
However, the interval of changing oil should be adjusted according to the operating conditions.
Check the oil level in the gear box weekly and top up the gear oil if necessary.
Filling quantities each series are shown as follow.

Series	ZL100	ZL200	ZL300	ZL400
Q'ty(liter)	0.34	0.95	2.30	5.40



'Shell Omala S2 G 150 or equivalent grade lubricants' are recommendable met below Qualifications/Specifications.

- David Brown S1.53.101, 102, 103, 104
- Meets MAG (Cincinatti Machine) P34, 35, 59, 63, 74, 76-78
- ISO 12925-1 Type CKD, except ISO 680-1000. OSP 680 meets CKC
- DIN 51517-Part 3 (CLP), except ISO 1000
- AGMA 9005-EO2 (EP)
- US Steel 224

Food Grade Gear Oil

We recommend 'NEVASTANE XSH (150 to 460) or equivalent Synthetic (PAO) gear oils' suitable for incidental food contact met below Qualifications/Specifications.

- The formulation of oils complies with the FDA chapter 21 CFR, 178.3570.
- NSF H1 registered (No 147305, No 147302, No 147303, No 147304)
- Kosher, Halal and ISO 21469 certified.
- International specification: ISO 12925-1 CKD.
- DIN 51517-3 CLP
- DIN 51354-2 - FZG A/8, 3/90°C - Fail stage > 12
- ASTM D 4172 - 4 ball test - wear (scar diameter) - 0.3 mm.

TECHNICAL INFORMATION

TECHNICAL DATA

SPECIFICATIONS

Maximum Inlet Pressure	10 bar (1,000 kPa, 145 psi)
Maximum Differential Pressure	12 bar (1,200 kPa, 174 psi) Up to 30 bar is available with 'Front bearing cover'
Maximum Flow Rate	100 ㎥/hr (440 US GPM) Please consult JEC incase over 100 ㎥/hr up to 450 ㎥/hr
Temperature Range	-10 □ to 180 □ (14 □ to 356 □)
Viscosity Range	Up to 1,000,000 cPs
Noise Level	60 ~ 80 dB

MATERIALS

Product Wetted Steel Parts	AISI 316L (standard)
Product Wetted Seals	EPDM (standard)
Alternative Seals	NBR, FPM, PTFE Encapsulated, Perfluoro elastomer

SHAFT SEALS

Seal type	Single and Double Mech., O-ring and Lip-seal
Maximum Flushing Water Pressure	Maximum 0.5 bar (7 psi)
Flushing Water Consumption	0.25~0.5 ℓ /min (30~60 cubic inches/min)
Stationary Seal Ring Material	Tungsten Carbide
Rotating Seal Ring Material	Tungsten Carbide (standard) or Silicon Carbide
O-ring Material	EPDM (standard)
Lip-seal Material	PTFE(Polytetrafluoroethylene)

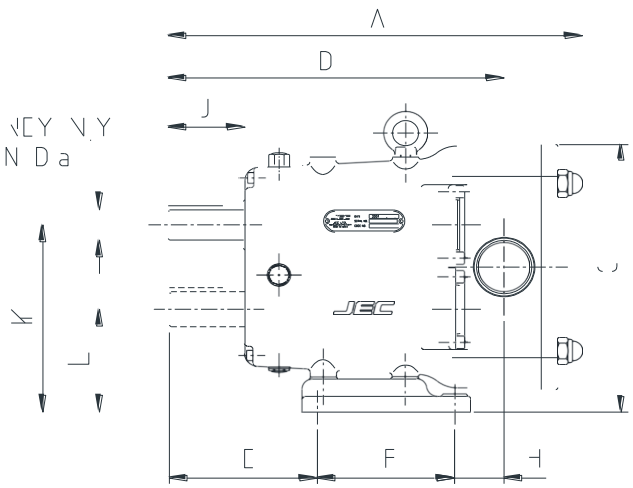
ROTOR INFORMATION

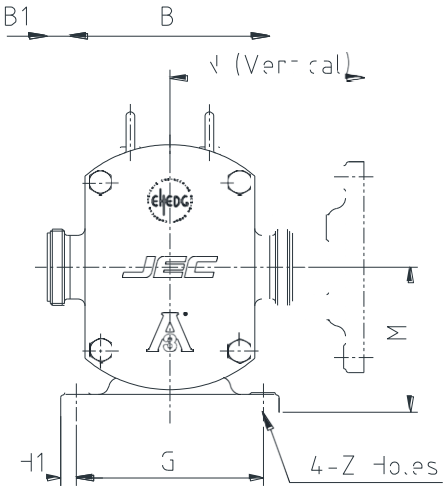
Single/Bi-wing and Bi-lobe/Tri-lobe/Heli-lobe are interchangeable.
Multi-lobe, Spur Gear-lobe optional.
Peek, PTFE coated and hardened rotors optional.
Rubber Heli-lobe rotors optional.

OPTIONAL INFORMATION

Ultra clean version
High pressure version up to 30 bar
Heating jacket on rotor case and front cover
Vertical type, Rectangular inlet version
Surface hardening

DIMENSIONAL DRAWING



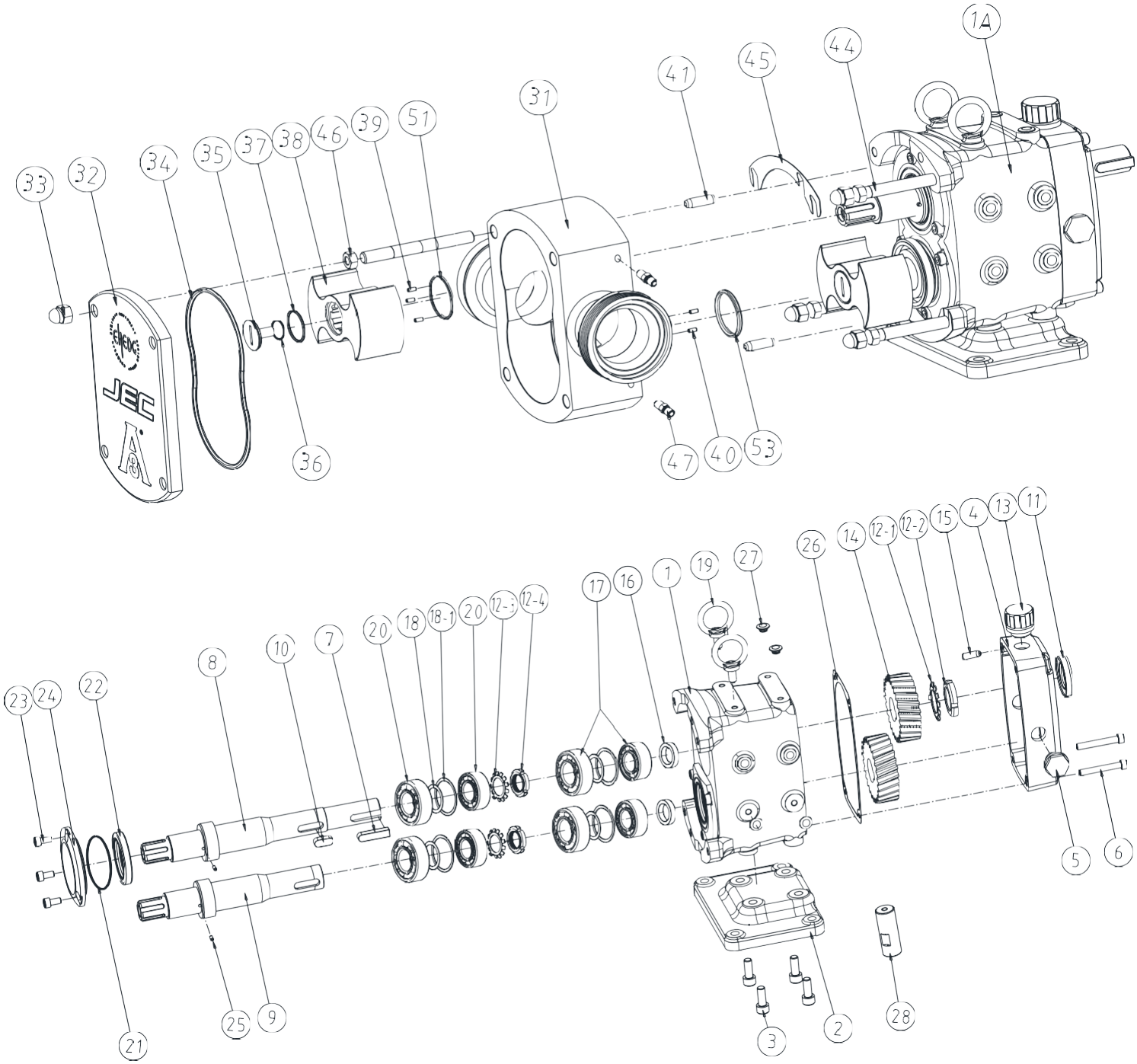


Model No.	Dimension (mm)																
	A	B	C	D	E	F	G	H	H1	J	K	L	M	N	X	Y	Z
ZL105-002-20	264	152	198	219	96	84	134	39	12	47	141	77	109	22	34	8	9
ZL110-005-20	264	152	195	212	96	84	134	39	12	47	141	77	109	22	34	8	9
ZL115-012-12	274	152	198	222	96	84	134	42	12	47	141	77	109	22	34	8	9
ZL120-021-08	290	152	198	229	96	84	134	49	12	47	141	77	109	22	34	8	9
ZL220-040-12	377	188	257	307	129	132	180	46	15	59	185	101	143	32	53	10	11
ZL225-062-08	400	188	257	320	129	132	180	54	15	59	185	101	143	32	53	10	11
ZL330-102-12	475	242	344	389	154	160	242	75	22	70	243.5	128.5	186	45	57	14	13
ZL340-144-08	500	242	344	402	154	160	242	88	22	70	243.5	128.5	186	45	57	14	13
ZL440-227-12	620	324	458	505	198	210	320	100	30	80	324	170	247	55	67	14	15
ZL450-334-08	655	324	458	522	198	210	320	117	30	80	324	170	247	55	67	14	15

Model No	Ports	Dimension B1 (mm)					Weight	Volume
		ISO	BS	DIN	SMS	FLANGE	KG	CBM
ZL105-002-20	1″	20	26	25	28	30	17	0.01
ZL110-005-20	1″	20	26	30	28	30	17	0.01
ZL115-012-12	1 1/2″	22	26	30	20	30	19	0.01
ZL120-021-08	2″	22	26	30	22	30	20	0.01
ZL220-040-12	2″	22	26	30	22	30	42	0.03
ZL225-062-08	2 1/2″	26	26	37	26	35	48	0.03
ZL330-102-12	3″	28	26	42	28	40	94	0.06
ZL340-144-08	4″	28	26	45	35	54	103	0.06
ZL440-227-12	4″	28	26	45	35	54	225	0.15
ZL450-334-08	5″	30	26	46	35	54	250	0.15

PARTS LIST

EXPLODED VIEW



All orders for repair parts must be contained the following;

1. Complete model number (located on nameplate).
2. Pump serial number (located on nameplate).
3. Description and part number from the parts list.

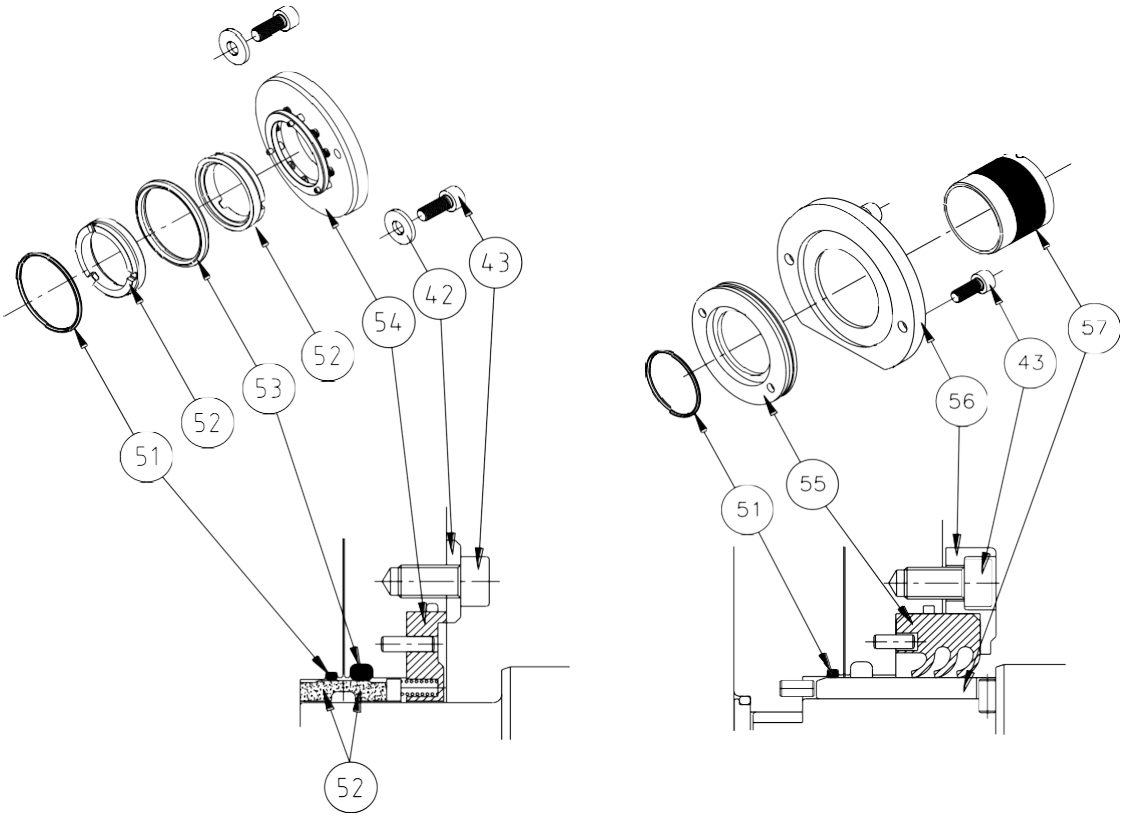
Please refer the 'Parts list' separately for further reference.

ITEM	PART NO.	Description	Material	Q'ty	
				Per Ass'y	Per Pump
1	ZL10-GB03-CS	Gear Box	FCD40	1	1
	ZL10-GB03-SS	Gear Box	SUS304	1	1
2	ZL10-GB05-CS	Base, Gear Box	FCD40	1	1
	ZL10-GB05-SS	Base, Gear Box	SUS304	1	1
3	ZL10-WB03-SS	Wrench Bolt, Base(M8x20L)	SUS304	1	4
4	ZL10-GB04-CS	Cover, Gear Box	FCD40	1	1
	ZL10-GB04-SS	Cover, Gear Box	SUS304	1	1
5	ZL12-LD01-CS	Plug, Level, Drain		1	3
6	ZL10-WB02-CS	Wrench Bolt, Gear Box Cover (M6x45L)	S45C	1	4
7	ZL10-SK01-CS	Key, Shaft (8x7x34)	S45C	1	1
8	ZL10-SF01-SS	Shaft, Drive	SUS304	1	1
	ZL10-SF03-SS	Shaft, Drive	SUS304	1	1
9	ZL10-SF02-SS	Shaft, Idle	SUS304	1	1
	ZL10-SF04-SS	Shaft, Idle	SUS304	1	1
10	ZL10-GK01-CS	Key, Gear (8x7x21)	S45C	1	2
11	ZL10-OS02-L5	Oil Seal, Cover(23x43x7t)	NBR	1	1
	ZL10-OS02-L2	Oil Seal, Cover(23x43x7t)	FPM	1	1
12	ZL10-LW01-CS	Lock Washer	S45C	1	2
12-1	ZL10-LN01-CS	Lock Nut	S45C	1	2
13	ZL12-RV01-PE	Valve, Relief	PE	1	1
14	ZL10-HG01-CS	Helical Gear	S45C	1	2
15	ZL10-PN05-SS	Dowel, Gear Box (Φ6)	SUS304	1	2
16	ZL10-GS01-CS	Spacer, Gear (Φ35x5L)	S45C	1	2
17	ZL10-BE02-CS	Bearing, Rear (#5205)		1	2
18	ZL10-BS01-CS	Spacer, Bearing	S45C	1	2
19	ZL10-IB04-SS	I-bolt / M8	SUS304	1	2
20	ZL10-BE01-CC	Bearing, Front (#5206)		1	2
21	ZL10-OR01-L2	O-ring, Oil seal gland (AN035)	FPM	1	2
22	ZL10-OS01-L5	Oil Seal, Gear Box (38x55x9t)	NBR	1	2
	ZL10-OS01-L2	Oil Seal, Gear Box (38x55x9t)	FPM	1	2
23	ZL10-WB01-SS	Wrench Bolt, Oil Seal Gland (M6x10L)	SUS304	3	6
24	ZL10-OG01-SS	Gland, Oil Seal	SUS304	1	2
25	ZL10-PN01-SS	Pin, Double Seal	SUS304	1	2
26	ZL10-GG01-LL	Gasket	Paper	1	1
27	ZL10-PG01-LL	Plug (M8)	PE	1	8
28	ZL10-VA01-SS	Vertical adaptor	SUS304	1	4

ITEM	PART NO.	Description	Material	Q'ty	
				Per Ass'y	Per Pump
1A	ZL10-GB01-A1	Gear Box Ass'y - White	FCD40	1	1
	ZL10-GB01-A2	Gear Box Ass'y - Silver	FCD40	1	1
	ZL10-GB01-A3	Gear Box Ass'y - Stainless Steel	SUS304	1	1
	ZL10-GB02-A1	Gear Box Ass'y - White	FCD40	1	1
	ZL10-GB02-A2	Gear Box Ass'y - Silver	FCD40	1	1
	ZL10-GB02-A3	Gear Box Ass'y - Stainless Steel Rotor	SUS304	1	1
31	ZL10-RC01-SS	Rotor Case *	SUS316L	1	1
32	ZL10-FC05-SS	Front Cover	SUS316L	1	1
	ZL10-FC01-SS	Front Cover	SUS316L	1	1
	ZL10-FC02-SS	Front Cover	SUS316L	1	1
33	ZL10-CN01-SS	Cap Nut	SUS304	1	4
34	ZL10-OR08-1-L1	O-ring, Front Cover (AN246)	EPDM	1	1
	ZL10-OR08-1-L2	O-ring, Front Cover (AN246)	FPM	1	1
	ZL10-OR08-1-L3	O-ring, Front Cover (AN246)	Perfluoro	1	1
	ZL10-OR08-1-L4	O-ring, Front Cover (AN246)	Teflon capsule	1	1
	ZL10-OR08-L1	O-ring, Front Cover (AN248)	EPDM	1	1
	ZL10-OR08-L2	O-ring, Front Cover (AN248)	FPM	1	1
	ZL10-OR08-L3	O-ring, Front Cover (AN248)	Perfluoro	1	1
	ZL10-OR08-L4	O-ring, Front Cover (AN248)	Teflon capsule	1	1
	ZL10-OR09-L1	O-ring, Front Cover (AN251)	EPDM	1	1
	ZL10-OR09-L2	O-ring, Front Cover (AN251)	FPM	1	1
	ZL10-OR09-L3	O-ring, Front Cover (AN251)	Perfluoro	1	1
	ZL10-OR09-L4	O-ring, Front Cover (AN251)	Teflon capsule	1	1
35	ZL10-RB01-SS	Rotor Bolt	SUS316L	1	2
36	ZL10-SW01-SS	Spring Washer, Rotor Bolt	SUS304	1	2
37	ZL10-OR05-L1	O-ring, Rotor Bolt(AN021)	EPDM	1	2
	ZL10-OR05-L2	O-ring, Rotor Bolt(AN021)	FPM	1	2
	ZL10-OR05-L3	O-ring, Rotor Bolt(AN021)	Perfluoro	1	2
38	ZL10-RT01-SS	Rotor *	SUS316L	1	2
39	ZL10-PN02-SS	Seal pin, Rotor	SUS304	3	6
40	ZL10-PN03-SS	Seal pin, Case	SUS304	2	4
41	ZL10-PN04-SS	Dowel, Rotor Case (Φ6)	SUS304	1	2
44	ZL10-SB01-SS	Stud Bolt, Case (M8)	SUS304	1	4
	ZL10-SB02-SS	Stud Bolt, Case (M8)	SUS304	1	4
	ZL10-SB03-SS	Stud Bolt, Case (M8)	SUS304	1	4
45	ZL10-SP01-SS	Shim, 0.05mm	SUS304	1	2
	ZL10-SP02-SS	Shim, 0.1mm	SUS304	1	2
46	ZL10-HN01-SS	Hex nut, Stud Bolt (M8)	SUS304	2	4
47	ZL10-NC02-LL	Nipple, Flush (PT 1/8")	SUS304	1	2
48	ZL10-NP01-AL	Name Plate	SUS304	1	1
51	ZL10-OR03-L1	O-ring, Rotor (AN028)	EPDM	1	2
	ZL10-OR03-L2	O-ring, Rotor (AN028)	FPM	1	2
	ZL10-OR03-L3	O-ring, Rotor (AN028)	Perfluoro	1	2
53	ZL10-OR04-L1	O-ring, Rotor Case (AN220)	EPDM	1	2
	ZL10-OR04-L2	O-ring, Rotor Case (AN220)	FPM	1	2
	ZL10-OR04-L3	O-ring, Rotor Case (AN220)	Perfluoro	1	2

ITEM	PART NO.	Description	Material	Q'ty	
				Per Ass'y	Per Pump
31	ZL10-RC41-SS	Rotor Case-1.5"DIN11851	SUS316L	1	1
	ZL10-RC42-SS	Rotor Case-1.5"DIN2633(FLANGE)	SUS316L	1	1
	ZL10-RC43-SS	Rotor Case-1.5"DS722.1	SUS316L	1	1
	ZL10-RC44-SS	Rotor Case-1.5"ISOMALE(IDF)	SUS316L	1	1
	ZL10-RC45-SS	Rotor Case-1.5"RJT	SUS316L	1	1
	ZL10-RC46-SS	Rotor Case-1.5"SMS	SUS316L	1	1
	ZL10-RC47-SS	Rotor Case-1.5"TRICLAMP	SUS316L	1	1
	ZL10-RC48-SS	Rotor Case-1.5"FLANGE	SUS316L	1	1
31	ZL10-RC61-SS	Rotor Case-2"DIN11851	SUS316L	1	1
	ZL10-RC62-SS	Rotor Case-2"DIN2633(FLANGE)	SUS316L	1	1
	ZL10-RC63-SS	Rotor Case-2"DS722.1	SUS316L	1	1
	ZL10-RC64-SS	Rotor Case-2"ISOMALE(IDF)	SUS316L	1	1
	ZL10-RC65-SS	Rotor Case-2"RJT	SUS316L	1	1
	ZL10-RC66-SS	Rotor Case-2"SMS	SUS316L	1	1
	ZL10-RC67-SS	Rotor Case-2"TRICLAMP	SUS316L	1	1
	ZL10-RC68-SS	Rotor Case-2"FLANGE	SUS316L	1	1
38	ZL10-RT03-SS	Rotor, Multi-Lobe	SUS316L	1	2
	ZL10-RT03-SS-RV	Rotor, Multi-Lobe, Relief Valve	SUS316L	1	2
	ZL10-RT02-SS	Rotor, Bi-Wing	SUS316L	1	2
	ZL10-RT02-SS-RV	Rotor, Bi-Wing, Relief Valve	SUS316L	1	2
	ZL10-RT02-SS-T	Rotor, Bi-Wing, Teflon-Inserted	SUS316L/Teflon	1	2
	ZL10-RT02-SS-H	Rotor, Bi-Wing, high temp clearance	SUS316L	1	2
	ZL10-RT05-SS	Rotor, Multi-Lobe	SUS316L	1	2
	ZL10-RT11-SS	Rotor, Single-Wing	SUS316L	1	2
	ZL10-RT12-SS	Rotor, Bi-Wing	SUS316L	1	2
	ZL10-RT12-SS-T	Rotor, Bi-Wing Teflon-Inserted	SUS316L/Teflon	1	2
	ZL10-RT12-SS-H	Rotor, Bi-Wing, high temp clearance	SUS316L	1	2
	ZL10-RT13-SS	Rotor, Bi-Lobe	SUS316L	1	2
	ZL10-RT14-SS	Rotor, Tri-Lobe	SUS316L	1	2
	ZL10-RT14-SS-H	Rotor, Tri-Lobe, high temp clearance	SUS316L	1	2
	ZL10-RT14H-SS-HE	Rotor, Heli-Lobe	SUS316L	1	2
	ZL10-RT15-SS	Rotor, Multi-Lobe	SUS316L	1	2
	ZL10-RT16-SS	Rotor, Single-Wing	SUS316L	1	2
	ZL10-RT17-SS	Rotor, Bi-Wing	SUS316L	1	2
	ZL10-RT17-SS-T	Rotor, Bi-Wing Teflon-Inserted	SUS316L/Teflon	1	2
	ZL10-RT17-SS-H	Rotor, Bi-Wing, high temp clearance	SUS316L	1	2
	ZL10-RT18-SS	Rotor, Bi-Lobe	SUS316L	1	2
	ZL10-RT19-SS	Rotor, Tri-Lobe	SUS316L	1	2
	ZL10-RT19-SS-H	Rotor, Tri-Lobe, high temp clearance	SUS316L	1	2
	ZL10-RT19H-SS-HE	Rotor, Heli-Lobe	SUS316L	1	2
	ZL10-RT20-SS	Rotor, Multi-Lobe	SUS316L	1	2

SINGLE MECHANICAL SEAL & TRIPLE LIP SEAL



ITEM	PART NO.	Description	Material	Q'ty	
				Per Ass'y	Per Pump
42	ZL10-FW01-SS	Flat Washer, M/Seal Gland (Φ6)	SUS304	2	4
43	ZL10-WB04-SS	Wrench Bolt, M/Seal Gland (M6x10L)	SUS304	2	4
51	ZL10-OR03-L1	O-ring, Rotor (AN028)	EPDM	1	2
	ZL10-OR03-L2	O-ring, Rotor (AN028)	FPM	1	2
	ZL10-OR03-L3	O-ring, Rotor (AN028)	Perfluoro	1	2
52	ZL10-SE06-SS	Seal Ring	TC	2	4
	ZL10-SE07-SS	Seal Ring	SiC	2	4
53	ZL10-OR04-L1	O-ring, Rotor Case (AN220)	EPDM	1	2
	ZL10-OR04-L2	O-ring, Rotor Case (AN220)	FPM	1	2
	ZL10-OR04-L3	O-ring, Rotor Case (AN220)	Perfluoro	1	2
54	ZL10-SE01-S3	Single Seal Body, Case	SUS304	1	2
	ZL10-SE01-S3-H	Single Seal Body, Case (w/20 springs)	SUS304	1	2
56	ZL10-SE05-S2	Lip Seal Cover	SUS304	1	2
55	ZL10-SE05-S3	Triple Lip Seal, Product	PTFE	1	2
57	ZL10-SE08-SS	Ceramic Coated Sleeve, Product	Ceramic/SUS304	1	2

Ver. JRZLM-1701

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