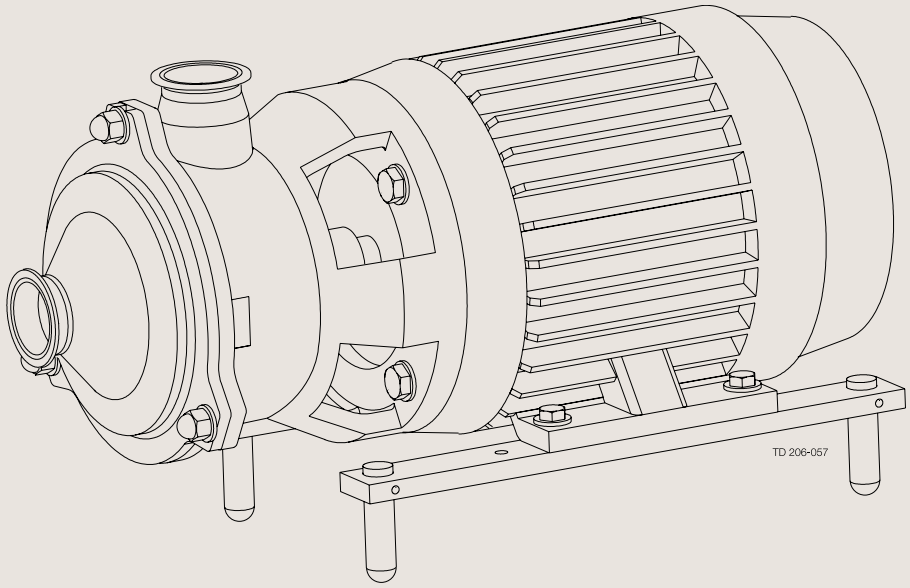
Instruction Manual

MR-166US, -185US, -200US Liquid-Ring Pump



IM70733-US6 20. - -01

Original Manual

EC Declaration of Conformity

The designated company

Alfa Laval
Company Name

Albuen 31, DK-6000 Kolding, Denmark
Address

+45 79 32 22 00
Phone No.

hereby declare that

Pump	MR	
Denomination	Type	Year

is in conformity with the following directives with amendments:
- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC
- Machinery Directive 2006/42/EC

The technical construction file is retained at the above address

Manager, Product Centres & Fluid Handling	Bjarne Søndergaard
Title	Name
Alfa Laval Kolding	
Company	Signature

Designation

CE

Table of contents

The information contained herein is correct at the time of issue but may be subject to change without prior notice.

CENTREX TECHNICAL SALES

Unsafe practices and other important information are emphasized in this manual.
Warnings are emphasized by means of special signs.
All warnings in the manual are summarized on this page.
Pay special attention to the instructions below so that severe personal injury or damage to the pump are avoided.

Always read the manual before using the pump!

WARNING!
Indicates that special procedures **must** be followed to avoid severe personal injury.

CAUTION!
Indicates that special procedures **must** be followed to avoid damage to the pump.

NOTE!
Indicates important information to simplify or clarify practices.

General warning:

Dangerous electrical voltage:

Caustic agents:

Recycling information.

• Unpacking

- Packing material consists of wood, plastics, cardboard boxes and in some cases metal straps.
- Wood and cardboard boxes can be reused, recycled or used for energy recovery.
- Plastics should be recycled or burnt at a licensed waste incineration plant.
- Metal straps should be sent for material recycling.

• Maintenance

- During maintenance oil and wear parts in the machine are replaced.
- All metal parts should be sent for material recycling.
- Worn out or defective electronic parts should be sent to a licensed handler for material recycling.
- Oil and all non metal wear parts must be taken care of in agreement with local regulations.

• Scrapping

- At end of use, the equipment shall be recycled according to relevant, local regulations. Beside the equipment itself, any hazardous residues from the process liquid must be considered and dealt with in a proper manner. When in doubt, or in the absence of local regulations, please contact the local Alfa Laval sales company.

1.3 Safety precautions

Unsafe practices and other important information are emphasized in this manual.
Warnings are emphasized by means of special signs.
All warnings in the manual are summarized on this page.
Pay special attention to the instructions below so that severe personal injury or damage to the pump are avoided.

Installation

- **Always** observe the technical data (see chapter 5).
- **Never** stick your fingers or any tool through the adaptor or the drain hole in the pump casing when the pump is running.
- **Never** test the direction of rotation with liquid in the pump.

- The pump **must** be electrically connected by authorized personnel (see the motor instructions).
- **Always** disconnect the power supply before dismantling the pump.

Operation

- **Always** observe the technical data (see chapter 5).
- **Never** touch the pump or the pipelines when pumping hot liquids or when sterilizing.
- **Never** run the pump with both the suction side and the pressure side blocked.
- **Never** stick your fingers or any tool through the adaptor or the drain hole in the pump casing when the pump is running.

Always handle lye and acid with great care.

Maintenance

- **Always** observe the technical data (see chapter 5).
- The pump must **never** be hot when serviced.
- The pump and the pipelines must **never** be pressurised when the pump is serviced.

Always disconnect the power supply when the pump is serviced.

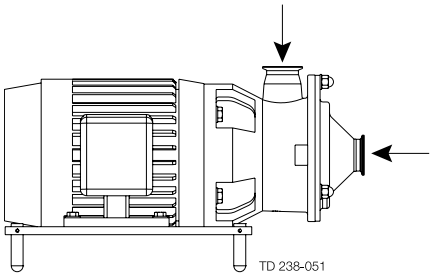
Transportation: See addendum

The instruction manual is part of the delivery.
Study the instructions carefully.
The pump is available in three sizes, MR-166US, MR-185US and MR-200US.

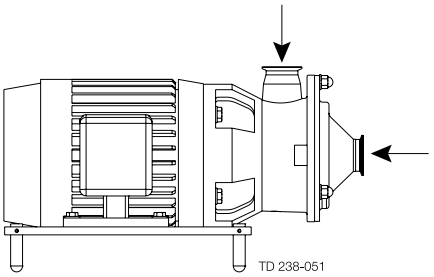
Step 1
NOTE!
Alfa Laval cannot be held responsible for incorrect unpacking.
Inspect the pump for visible transport damages.

Check the delivery for:
1. Complete pump, MR-166US, MR-185US or MR-200US.
2. Delivery note.
4. Motor instructions.

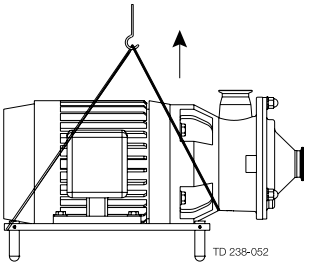
Step 2
Clean the inlet and the outlet from possible packing materials.



Step 3
Avoid damaging the inlet and the outlet.



Step 4
Always remove the shroud, if fitted, before lifting the pump.



Study the instructions carefully and pay special attention to the warnings!
The direction of rotation of the impeller can be checked by observing the direction of rotation of the motor fan.
- See the indication label on the pump.

Step 1

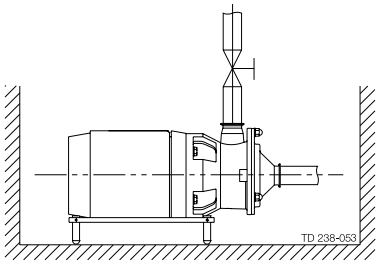
⚠

- **Always** observe the technical data (see chapter 5).
- **Never** stick your fingers or any tool through the bracket or the drain hole in the pump casing when the pump is running.

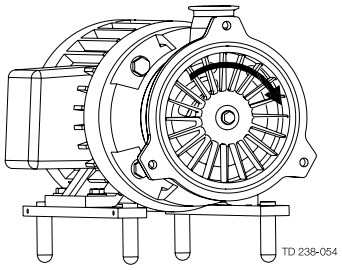
⚠

The pump **must** be electrically connected by authorized personnel (see the motor instructions).
NOTE!
Alfa Laval cannot be held responsible for incorrect installation.

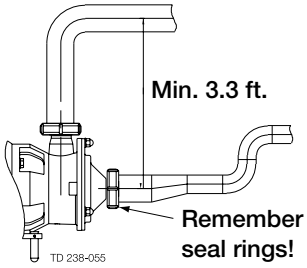
Step 2
Ensure at least 1.64 ft clearance around the pump.



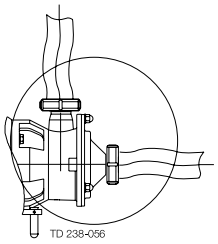
Step 3
Ensure that the flow direction is correct.



Step 4
1. Ensure that the pipelines are correctly routed.
2. Ensure that connections are tight.



Step 5
Avoid stressing the pump.
Pay special attention to:
- Vibrations.
- Thermal expansion of the tubes.
- Excessive welding.
- Overloading of the pipelines.

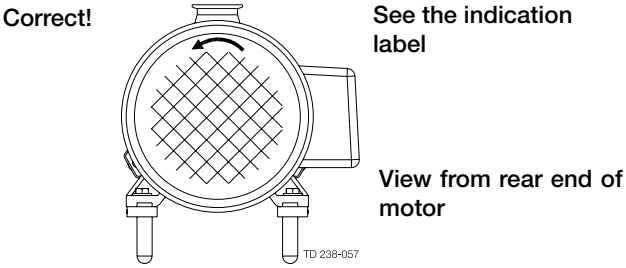


Step 6

⚠

Never test the direction of rotation with liquid in the pump.

Pre-use check:
1. Start and stop the motor momentarily.
2. Ensure that the direction of rotation of the motor is **counterclockwise** as viewed from the back of the motor.



Study the instructions carefully and pay special attention to the warnings!
The direction of rotation of the impeller can be checked by observing the direction of rotation of the motor fan.
- See the indication label on the pump.

Step 1

⚠

- **Always** observe the technical data (see chapter 5).
- **Never** stick your fingers or any tool through the adaptor or the drain hole in the pump casing when the pump is running.

⚠

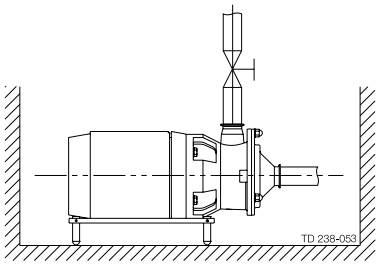
The pump must be electrically connected by authorized personnel (see the motor instructions).

NOTE!

Alfa Laval cannot be held responsible for incorrect installation.

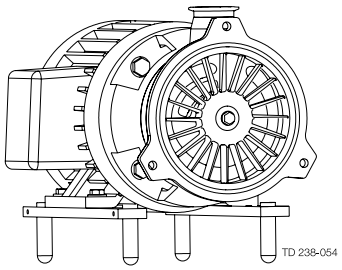
Step 2

Ensure at least 1.64 ft clearance around the pump.



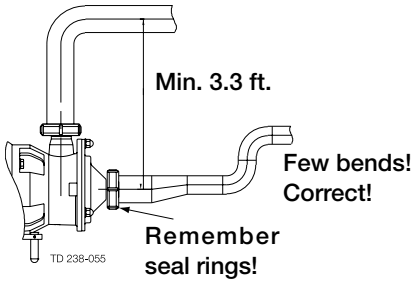
Step 3

Ensure that the flow direction is correct.



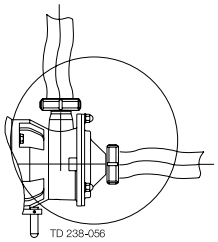
Step 4

1. Ensure that pipelines are routed correctly.
2. Ensure that connections are tight.



Step 5

Avoid stressing the pump.
Pay special attention to:
- Vibrations.
- Thermal expansion of the tubes.
- Excessive welding.
- Overloading of the pipelines.



Risk of damage!

Step 6

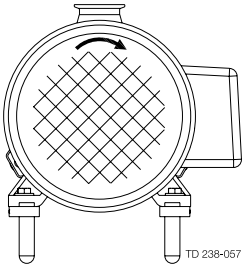
⚠

Never test the direction of rotation with liquid in the pump.

Pre-use check:

1. Start and stop the motor momentarily.
2. Ensure that the direction of rotation of the motor is **clockwise** as viewed from the back of the motor.

Correct!



See the indication label

View from rear end of motor

Study the instructions carefully and pay special attention to the warnings!
The pump is fitted with a warning label indicating correct throttling.

Step 1

⚠

Always observe the technical data (see chapter 5).

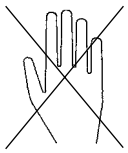
NOTE!
Alfa Laval cannot be held responsible for incorrect operation/control.

Step 2

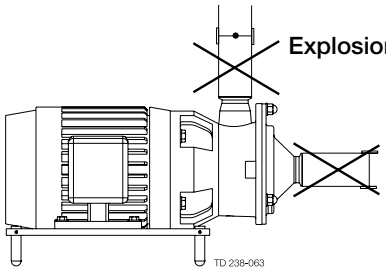
⚠

- **Never** touch the pump or the pipelines when pumping hot liquids or when sterilizing.
- **Never** stick your fingers or any tool through the adaptor or the drain hole in the pump casing when the pump is running.

Burning danger!
Rotating parts!

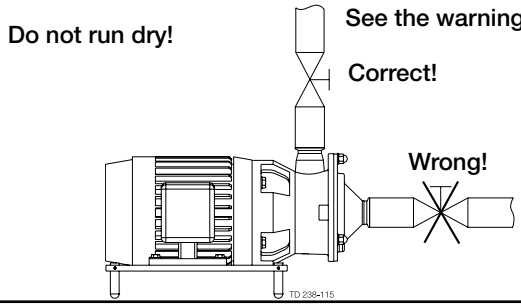


Step 3
Never run the pump with both the suction side and the pressure side blocked.



Step 4
CAUTION!
- The shaft seal must not run dry.
- Never throttle the inlet side.

Control:
Reduce the capacity by means of:
- Throttling the pressure side of the pump.
- Speed control of the motor.



Pay attention to possible faults.
Study the instructions carefully.

Step 1
NOTE!
Study the maintenance instructions carefully before replacing worn parts. - See section 4.1!

Problem	Cause/result	Repair
Leaking shaft seal	- Dry run (see section 3.1)	**Replace:** All wearing parts (see section 4.3)
	- Incorrect rubber grade	- Select a different rubber grade
	- Abrasive particles in the liquid	- Select stationary and rotating seal ring in Silicon Carbide/Silicon Carbide (only MR-185US, -200US)
Leaking seals	Incorrect rubber grade	Select a different rubber grade

The pump is designed for cleaning in place (CIP). CIP = Cleaning In Place.
Study the instructions carefully and pay special attention to the warnings!
NaOH = Caustic Soda.
HNO_3 = Nitric acid.

Step 1

Always handle lye and acid with great care.

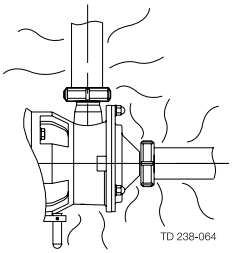
Caustic danger!

Always use rubber gloves!

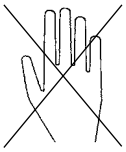
Always use protective goggles!

Step 2

Never touch the pump or the pipelines when sterilizing.



Burning danger!



Step 3
Examples of cleaning agents:
Use clean water, free from chlorides.

1. 1% by weight NaOH at 158°F.

2.2 lb NaOH	+	0.18 gal water	= Cleaning agent.
0.58 gal 33%NaOH	+	0.18 gal water	= Cleaning agent.

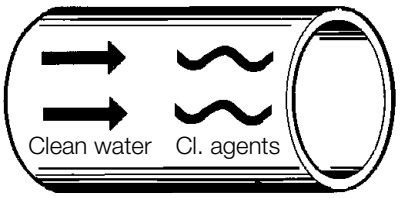
2. 0.5% by weight HNO_3 at 158°F.

0.18 gal 53% HNO_3	+	0.18 gal water	= Cleaning agent.

Step 4
1. Avoid excessive concentration of the cleaning agent
   ⇒ **Dose gradually!**
2. Adjust the cleaning flow to the process
   Milk sterilization/viscous liquids
   ⇒ **Increase the cleaning flow!**

Step 5
Always rinse well with clean water after the cleaning.

Always rinse!



Step 6
NOTE!
The cleaning agents must be stored/disposed of in accordance with current rules/directives.

Maintain the pump carefully.
Study the instructions carefully and pay special attention to the warnings!
Always keep spare shaft seals and rubber seals in stock.
See separate motor instructions.

Step 1

⚠

Always observe the technical data (see chapter 5).

⚠

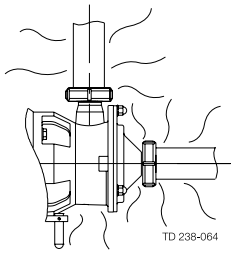
Always disconnect the power supply when the pump is serviced.

NOTE!
All scrap must be stored/discharged in accordance with current rules/directives.

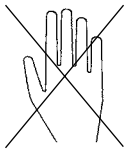
Step 2

⚠

The pump must **never** be hot when serviced.



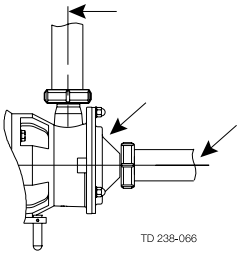
Burning danger!



Step 3

⚠

The pump and the pipelines must never be pressurised when the pump is serviced.



Atmospheric pressure required!

Step 4
CAUTION
- **Always** ensure that the impeller rotates smoothly after service.
- Always fit the electrical connections correctly if they have been removed from the motor during service (see pre-use check in section 2.2 and 2.3).

Pay special attention to the warnings!

1. Rotate impeller (11).
2. Ensure that the impeller does not contact pump casing (9) or casing cover (10).
3. Adjust the impeller position if necessary (see section 4.4 for MR-166US and section 4.5 for MR-185US and MR-200US).

Ordering spare parts
Contact the Sales Department.

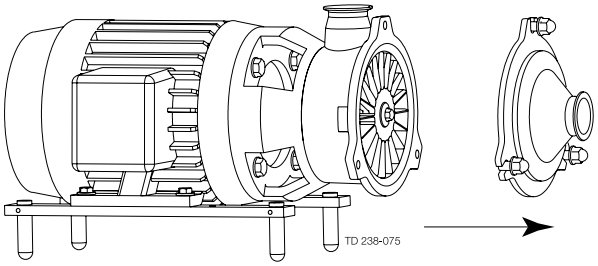
Recommended spare parts:
Service kits (see chapter 6).
Order service kits from the service kits list (see chapter 6).

Maintain the pump carefully.
Study the instructions carefully and pay special attention to the warnings!
Always keep spare shaft seals and rubber seals in stock.
See separate motor instructions. Check the pump for smooth operation after service.

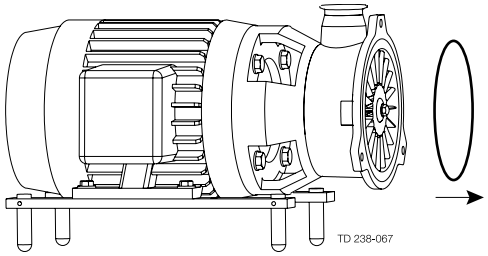
	Shaft seals	**Rubber seals**	**Motor bearings**
Preventive maintenance	**Replace after 12 months** (one-shift) Complete shaft seal	Replace when replacing the shaft seal	
Maintenance after leakage (leakage normally starts slowly)	**Replace at the end of the day:** Complete shaft seal	Replace when replacing the shaft seal	
Planned maintenance	- Regular inspection for leakage and smooth operation - Keep a record of the pump - Use the statistics for planning of inspections **Replace after leakage:** Complete shaft seal	Replace when replacing the shaft seal	Yearly inspection is recomm. - Replace complete bearing if worn - Ensure that the bearing is axially locked (See motor instructions)
Lubrication	**Before fitting** Lubricate the O-rings with silicone grease or silicone oil (not the sealing surfaces)	**Before fitting** Silicone grease or silicone oil	**None** The bearings are permanently lubricated

Study the instructions carefully.
The items refer to the parts list and service kits section.
Handle scrap correctly.

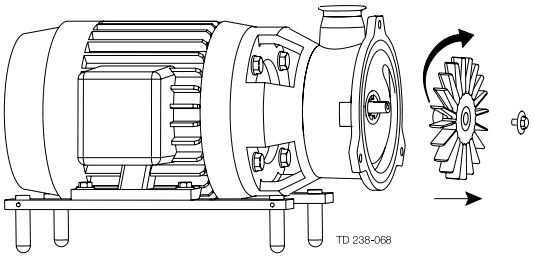
Step 1✹
Remove cap nuts (14), washers (15a) and casing cover (10).



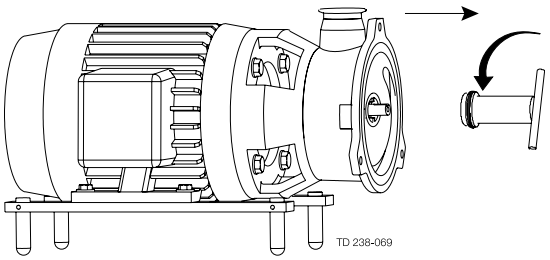
Step 2
Remove O-ring (8) from pump casing (9).



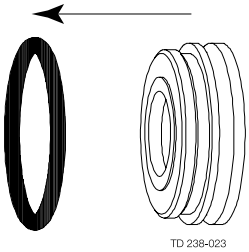
Step 3✹
1. Remove impeller nut **clockwise** (13), (counterhold stub shaft (3)).
2. Remove impeller (11) from the stub shaft.



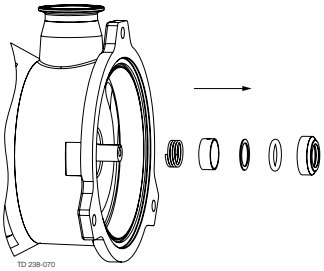
Step 4✹
Turn stationary seal ring (29) **counterclockwise** and remove it from pump casing (9) (use the tool supplied).



Step 5✹
Remove O-ring (30) from stationary seal ring (29).



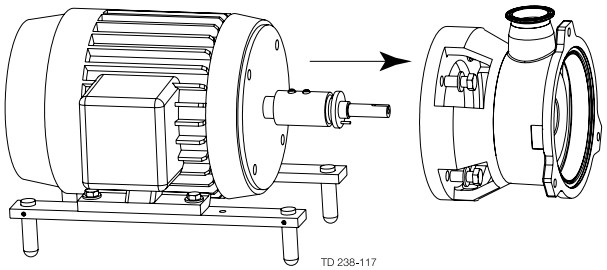
Step 6✹
Remove rotating seal ring (28), O-ring (27), washer (26), spacer ring (25) and spring (24) from stub shaft (3).
NOTE!
If necessary, place a screwdriver through the hole in pump casing (9) and push the seal parts out.



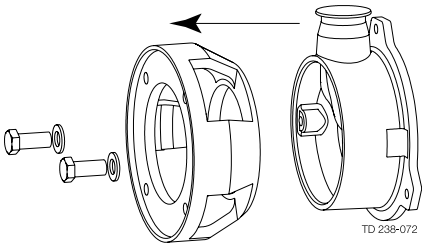
4.2 Dismantling of pump/Removing the shaft seal (2 and 4-8✹) MR-166US

Study the instructions carefully.
The items refer to the parts list and service kits section.
Handle scrap correctly.

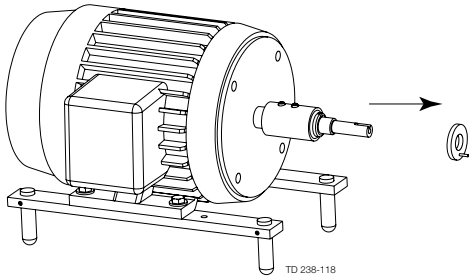
Step 7
1. Remove screws (45) and washers (46).
2. Remove bracket (2) together with pump casing (9).



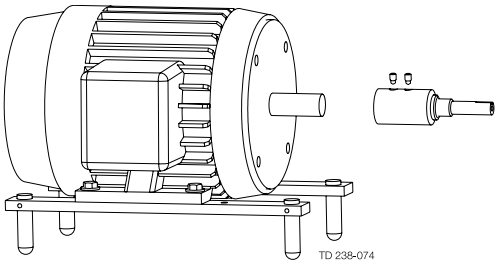
Step 8
1. Remove screws (40) and washers (41).
2. Remove pump casing (9) from bracket (2).



Step 9
Remove thrower (21) from stub shaft (3).



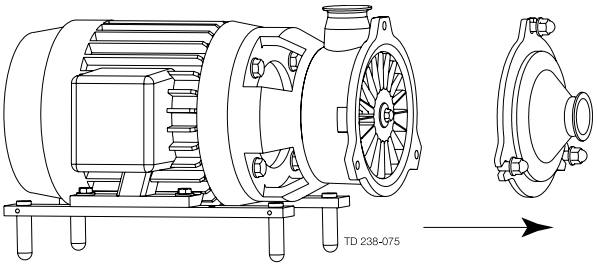
Step 10
1. Loosen screws (4).
2. Remove stub shaft (3).



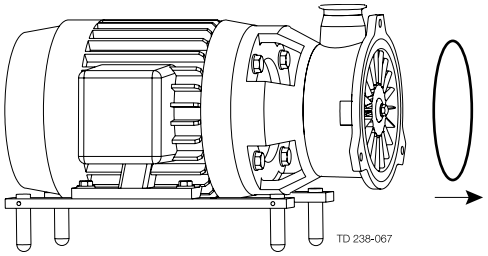
4.3 Dismantling of pump/Removing the shaft seal (2 and 4-7✹) MR-185US and MR-200US

Study the instructions carefully.
The items refer to the parts list and service kits section.
Handle scrap correctly.

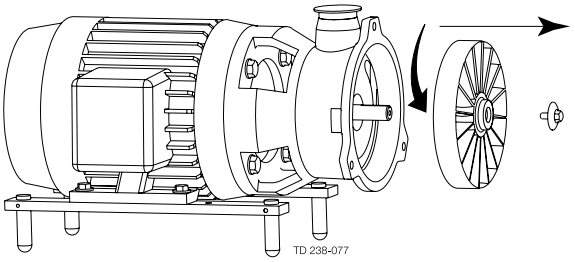
Step 1✹
Remove cap nuts (14), washers (15a) and casing cover (10).



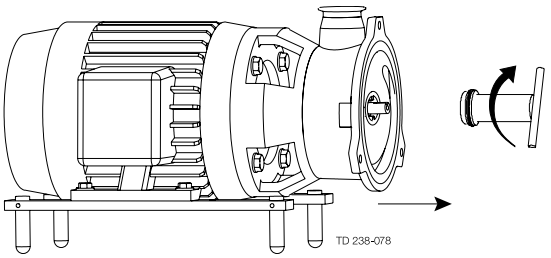
Step 2
Remove O-ring (8) from pump casing (9).



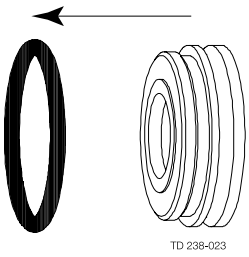
Step 3✹
1. Remove impeller nut (13) **counterclockwise**, (counterhold stub shaft (3)).
2. Remove impeller (11) from the stub shaft.



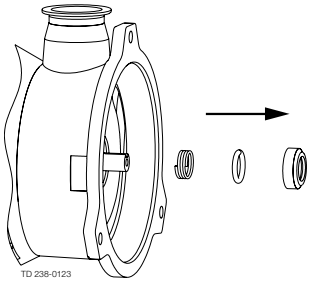
Step 4✹
- Turn stationary seal ring (28) **clockwise** and remove it from pump casing (9) (use the tool supplied).



Step 5✹
Remove O-ring (29) from stationary seal ring (28).



Step 6✹
Remove rotating seal ring (27), spring (25) and O-ring (26) from stub shaft (3).
NOTE!
If necessary, place a screwdriver through the hole in pump casing (★) and push the seal parts out.

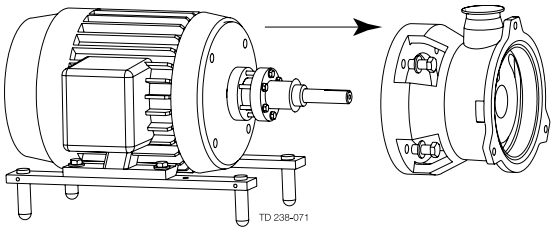


4.3 Dismantling of pump/Removing the shaft seal (2 and 4-7✹) MR-185US and MR-200US

Study the instructions carefully.
The items refer to the parts list and service kits section.
Handle scrap correctly.

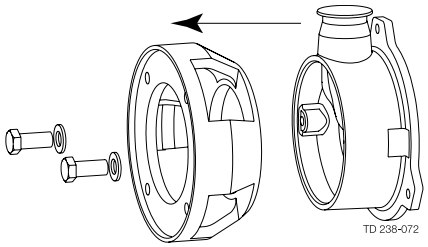
Step 7

1. Remove screws (6) and washers (7).
2. Remove adaptor (2) together with pump casing (9).



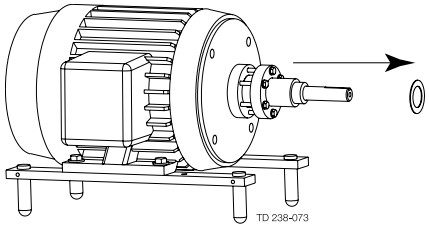
Step 8

1. Remove screws (16) and washers (17).
2. Remove pump casing (9) from adaptor (2).



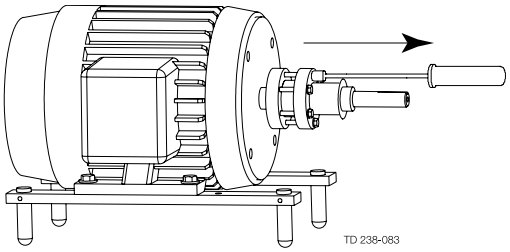
Step 9

Remove thrower (24) from stub shaft (3).



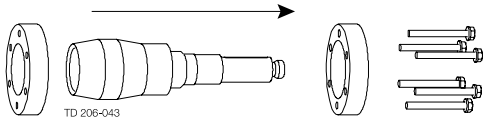
Step 10

1. Loosen screws (5).
2. Remove stub shaft (3) together with compression rings (4a+b).



Step 11

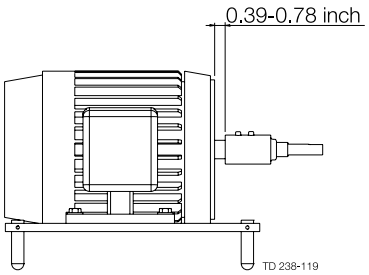
Remove screws (5), washer (5a) and compression rings (4a+b) from stub shaft (3).



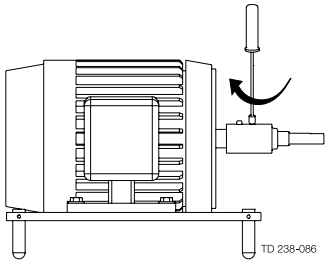
4.4 Assembly of pump/Fitting the shaft seal (11 - 14✹) MR-166US

Study the instructions carefully.
The items refer to the parts list and service kits section.
Lubricate the rubber seals before fitting them.

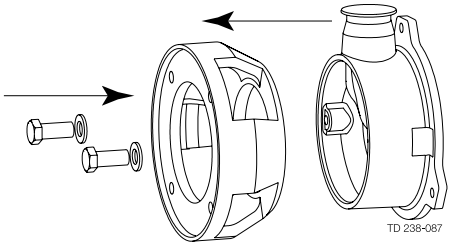
Step 1
1. Fit stub shaft (3) on the motor shaft.
2. Check the clearance between the end of the stub shaft and the motor flange 0.39-0.78 inch.



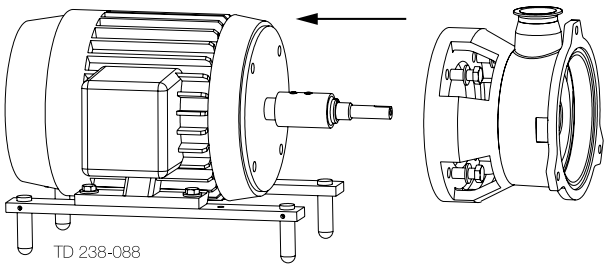
Step 2
1. Tighten screws (4) lightly and evenly.
2. Ensure the screws goes into the keyway of the motor shaft
3. Ensure that the stub shaft (3) can be moved on the motor shaft.



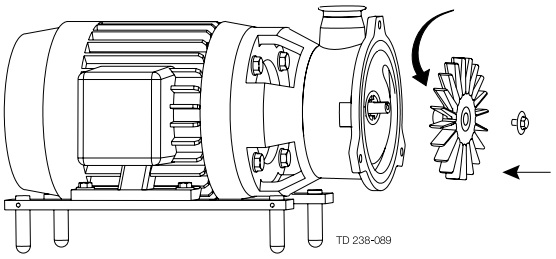
Step 3
1. Fit pump casing (9) on bracket (2).
2. Fit washers (41) and screws (40).
3. Tighten the screws.



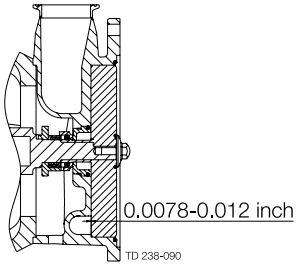
Step 4
1. Fit bracket (2) on the motor.
2. Fit washers (46) and screws (45).
3. Tighten the screws.



Step 5
1. Fit impeller (11) on stub shaft (3).
2. Fit impeller nut **counterclockwise** (13) on the shaft and tighten lightly.



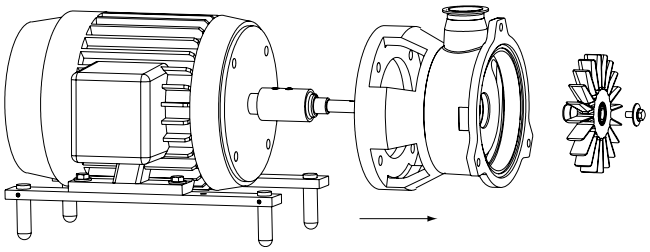
Step 6
Ensure that the clearance between impeller (11) and pump casing (9) is 0.0078-0.012 inch (tap gently with a plastic hammer).



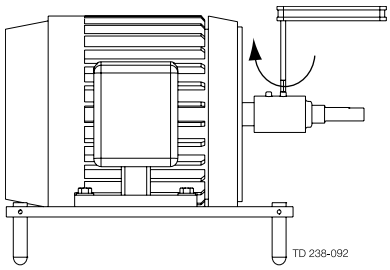
4.4 Assembly of pump/Fitting the shaft seal (11 - 14✹) MR-166US

Study the instructions carefully.
The items refer to the parts list and service kits section.
Lubricate the rubber seals before fitting them.

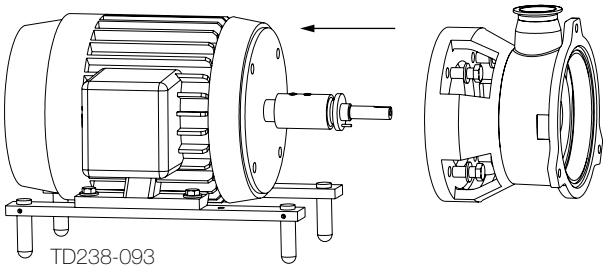
Step 7
Remove impeller (11), pump casing (9) and bracket (2) without moving stub shaft (3) on the motor shaft.



Step 8
Torque tighten screws (4) evenly to 13.3 lbf-ft .

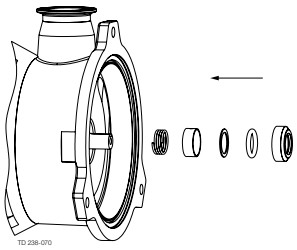


Step 9
1. Fit thrower (21) on stub shaft (3).
2. Fit bracket (2) together with pump casing (9) on the motor.
3. Fit washers (46) and screws (45).

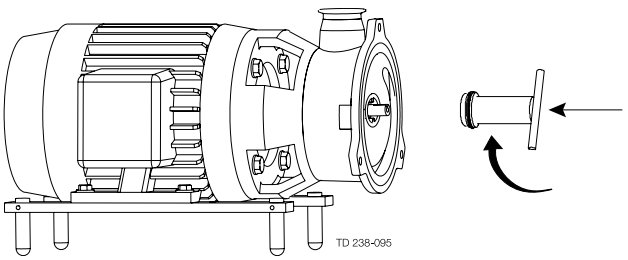


Step 10
CAUTION!
Ensure that the notch in the seal ring is opposite the driving pin on thrower (21).

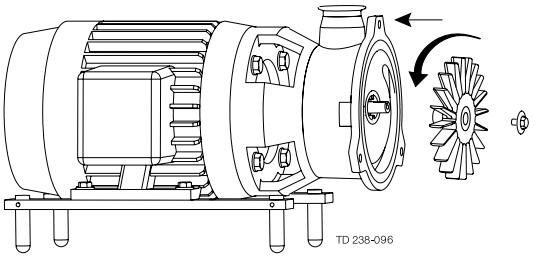
1. Fit spring (24), spacer ring (25) and washer (26) on the stub shaft.
2. Lubricate O-ring (27) and fit it on the stub shaft.
3. Fit rotating seal ring (28) on the stub shaft.



Step 11✹
1. Fit O-ring (30) on stationary seal ring (29).
2. Fit the seal ring in pump casing (9), turn it **clockwise** and tighten (use the tool supplied).



Step 12✹
1. Fit impeller (11) on the shaft.
2. Fit and tighten impeller nut (13) **counterclockwise** on the shaft.
3. Check that the clearance between the impeller and the pump casing (9) is 0.0078-0.012 inch (adjust if necessary).

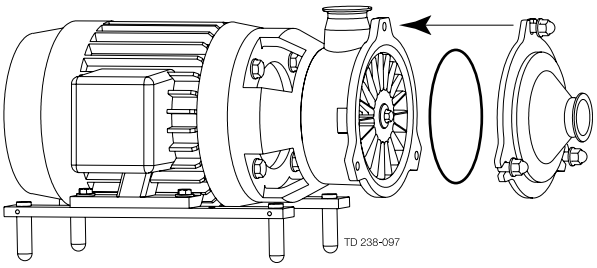


4.4 Assembly of pump/Fitting the shaft seal (11 - 14✹) MR-166US

Study the instructions carefully.
The items refer to the parts list and service kits section.
Lubricate the rubber seals before fitting them.

Step 13✹

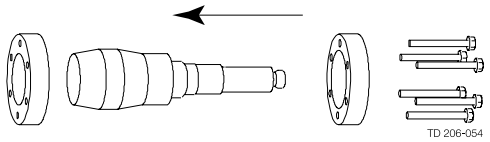
1. Fit O-ring (8) in pump casing (9).
2. Fit casing cover (10).
3. Fit washers (15a) and cap nuts (14).
4. Tighten the cap nuts firmly.
5. Ensure that impeller (11) rotates smoothly (see section 2.2).
   Note! Pay special attention to warnings.



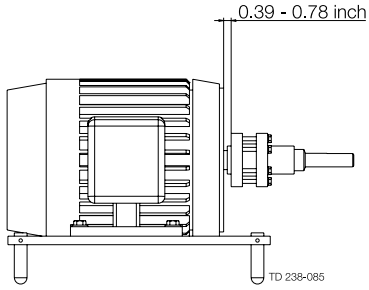
4.5 Assembly of pump/Fitting the shaft seal (11 - 14✹) MR-185US and MR-200US

Study the instructions carefully.
The items refer to the parts list and service kits section.
Lubricate the rubber seals before fitting them.

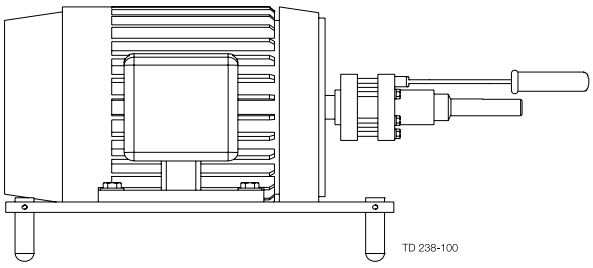
Step 1
Fit compression rings (4a+b), screws (5) and washer (5a) correctly on stub shaft (3).



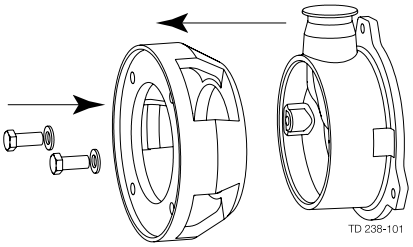
Step 2
1. Fit stub shaft (3) on the motor shaft.
2. Check the clearance between the end of the stub shaft and the motor flange 0.39-0.78 inch.



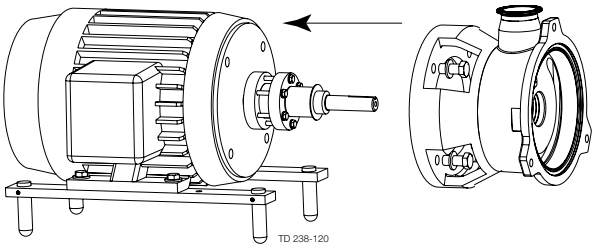
Step 3
1. Tighten screws (5) lightly and evenly.
2. Ensure that stub shaft (3) can be moved on the motor shaft.



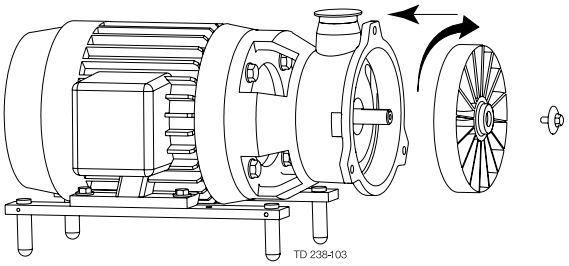
Step 4
1. Fit pump casing (9) on adaptor (2).
2. Fit washers (17) and screws (16).
3. Tighten the screws.



Step 5
1. Fit adaptor (2) on the motor.
2. Fit washers (7) and screws (6).
3. Tighten the screws.



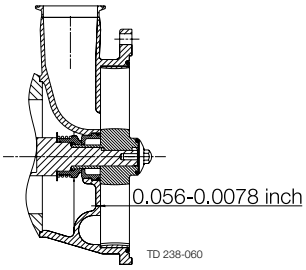
Step 6
1. Fit impeller (11) on stub shaft (3).
2. Fit impeller nut (13) **clockwise** on the shaft and tighten lightly.



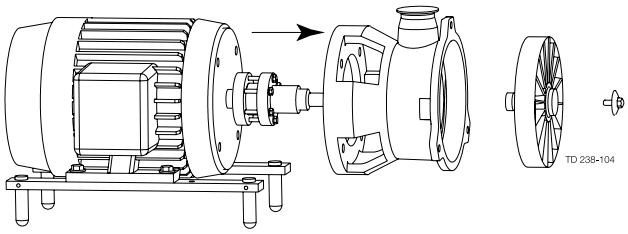
4.5 Assembly of pump/Fitting the shaft seal (11 - 14✹) MR-185US and MR-200US

Study the instructions carefully.
The items refer to the parts list and service kits section.
Lubricate the rubber seals before fitting them.

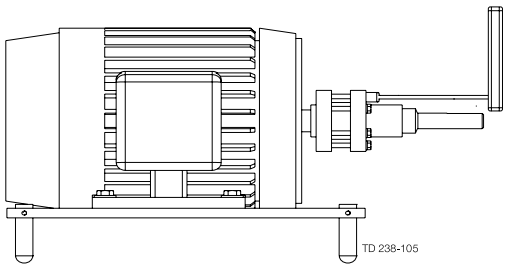
Step 7
Ensure that the clearance between impeller (11) and pump casing (9) is 0.056-0.0078 inch (tap gently with a plastic hammer).



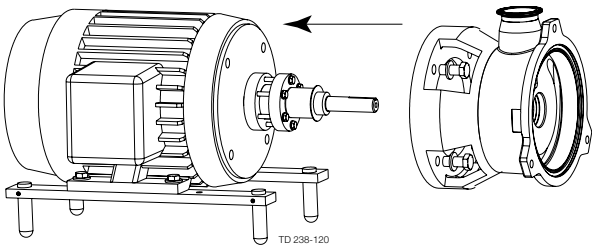
Step 8
Remove impeller screw (13), impeller (11), pump casing (9) and adaptor (2) without moving stub shaft (3) on the motor shaft.



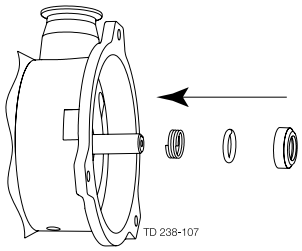
Step 9
Torque tighten screws (5) evenly to 11.05 lbf-ft (counterhold stub shaft (3)).



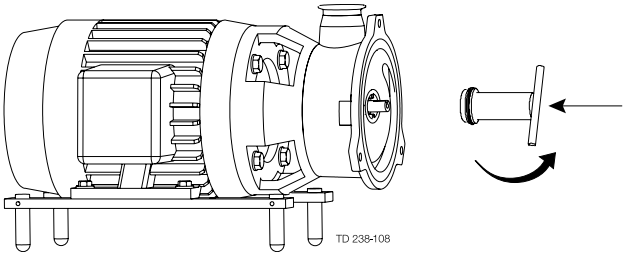
Step 10
1. Fit thrower (24) on stub shaft (3).
2. Fit adaptor (2) together with pump casing (9) on the motor.
3. Fit washers (7) and screws (6).



Step 11✹
1. Lubricate O-ring (26) and push it on stub shaft (3) and position it correctly.
2. Place spring (25) on rotating seal ring (27).
3. Push the seal ring over the O-ring as far as possible against the shoulder.



Step 12✹
1. Fit O-ring (29) on stationary seal ring (28).
2. Fit the seal ring in pump casing (9), turn **counterclockwise** and tighten (use the tool supplied).

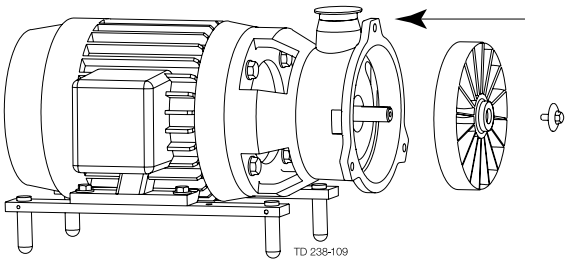


4.5 Assembly of pump/Fitting the shaft seal (11 - 14✹) MR-185US and MR-200US

Study the instructions carefully.
The items refer to the parts list and service kits section.
Lubricate the rubber seals before fitting them.

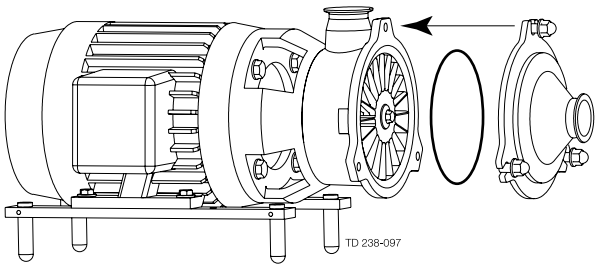
Step 13✹

1. Fit impeller (11) and impeller nut (13) on the shaft.
2. Tighten the nut **clockwise**.



Step 14✹

1. Fit O-ring (8) in pump casing (9).
2. Fit casing cover (10).
3. Fit washers (15a) and cap nuts (14).



It is important to observe the technical data during installation, operation and maintenance.
Inform the personnel about the technical data.

Data	
Max. inlet pressure	58 psi
Temperature range	14° F - 284° F EPDM
Materials	
Product wetted steel parts	AISI 316L
Other steel parts	AISI 304
Adaptor	Cast iron, zinc sprayed and coated with two-component laquer
Product wetted seals	EPDM (standard)
Alternative seals	Nitrile (NBR) and flourinated rubber (FPM)
Finish	Semi bright
Shaft seal	
Seal type	Mechanical single seal
Material, stationary seal ring	AISI 329 (standard) or AISI 329 with sealing surface of Silicon Carbide*
Material, rotating seal ring	Carbon (standard) or Silicon Carbide*
Material, O-rings	EPDM (standard)
Alternative material, O-rings	Nitrile (NBR) and flourinated rubber (FPM)
Motor	
Standard foot-flanged motor acc. to Nema standard 4 pol = 1800 rpm. at 60 Hz IP55 (with drain holes with labyrinth plug), insulation class F	
Voltage and frequency	3~, 60 Hz; 270/460 V
NEMA motors (Hp)	
Motor sizes, 60 Hz	3 (MR-166US)
Motor sizes, 60 Hz	7.5 (MR-185US)
Motor sizes, 60 Hz	15 (MR-200US)

* Only MR-185US and MR-200US.

Addendum

Section 1

Transportation Transportation of the pump or the pump unit:
- Never lift or elevate in any way other than described in this manual
- Always drain the pump head and accessories of any liquid
- Always ensure that no leakage of lubricants can occur
- Always transport the pump in it's upright position
- Always ensure that the unit is securely fixed during transportation
- Always use original packaging or similar during transportation

Section 2

Tightening torques
Below table specifies the tightening torques for the screws, bolts and nuts in this pump.
Always use below torques if no other values are stated. This can be a matter of personal safety.

Size	Tightening torgue	
	Nm	lbf-ft
M8	20	14.8
M10	40	29.5
M12	67	49.0
M14	110	81.0

Section 3

Noise

Pump Type	Sound pressure level (dBA)
LKH-5	60
LKH-10	69
LKH-15	72
LKH-20	70
LKH-25	74
LKH-35	71
LKH-40	75
LKH-45	70
LKH-50	75
LKH-60	77
LKH-70	88
LKH-75	79
LKH-85	86
LKH-90	75
LKH-112	70
LKH-113	69
LKH-114	68
LKH-122	75
LKH-123	77
LKH-124	80

Pump Type	Sound pressure level (dBA)
SolidC-1	68
SolidC-2	72
SolidC-3	73
SolidC-4	72
MR-166	76
MR-185	82
MR-200	81
MR-300	82
GM	54
FM-OS	61

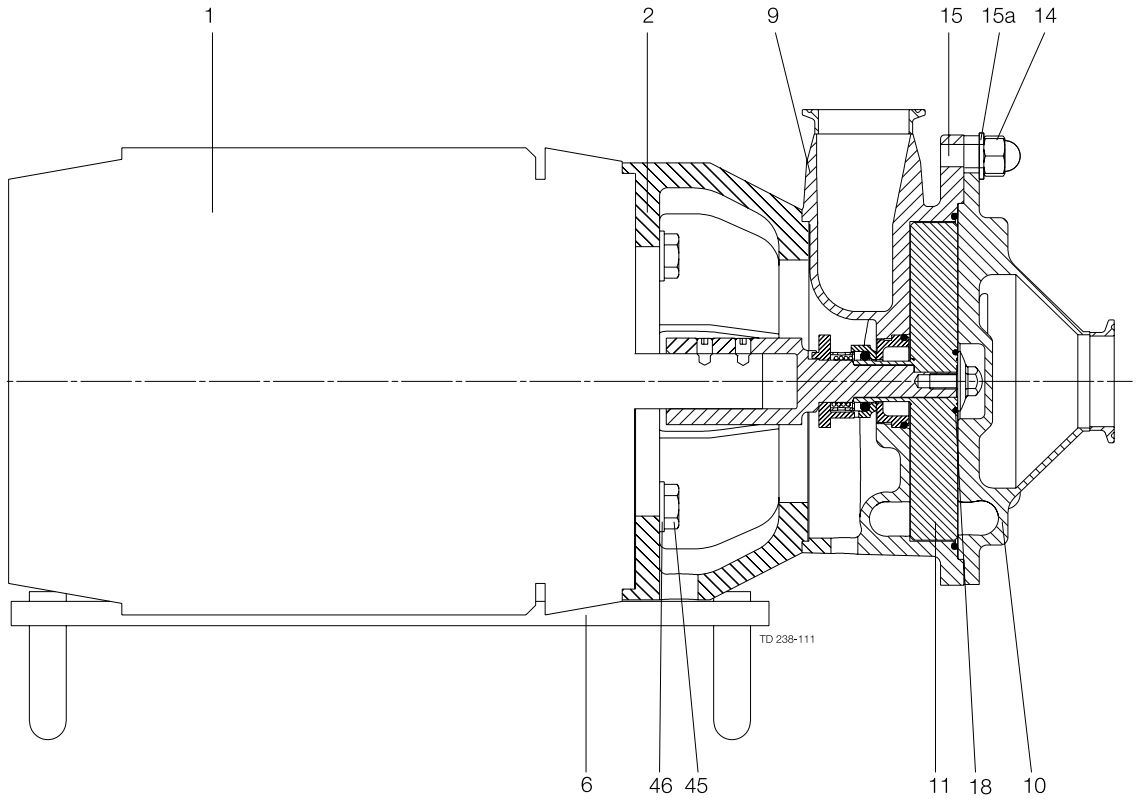
The above LKH noise levels are the same for LKHP, LKHI, LKH UltraPure, LKHex
The above SolidC noise levels are the same for SolidC UltraPure
The above MR noise levels are the same for MR UltraPure

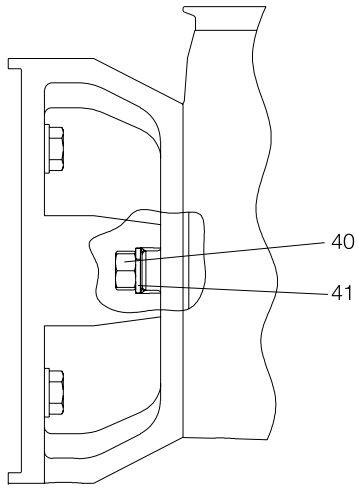
The noise measurements have been carried out with original motor and shroud, approximately at the Best Efficiency Point (BEP) with water at ambient temperature and at 50Hz.

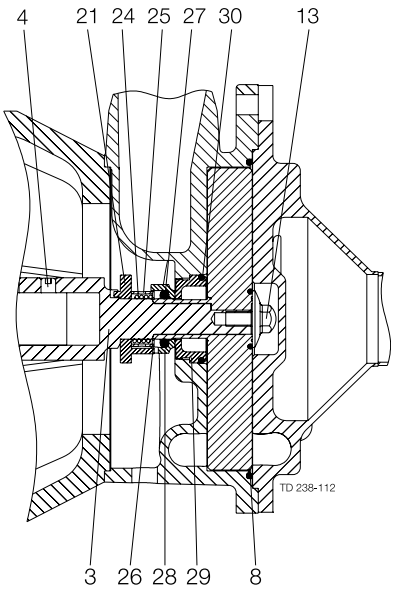
Very often the noise level generated by the flow through the process system (eg. valves, pipes, tanks etc.) is much higher than what is generated by the pump itself. Therefore it is important to consider the noise level from the total system and take the necessary percussions with regards to personal safety if required.

The drawings show MR-166US and include all items.

For further information see parts list section 6.2.

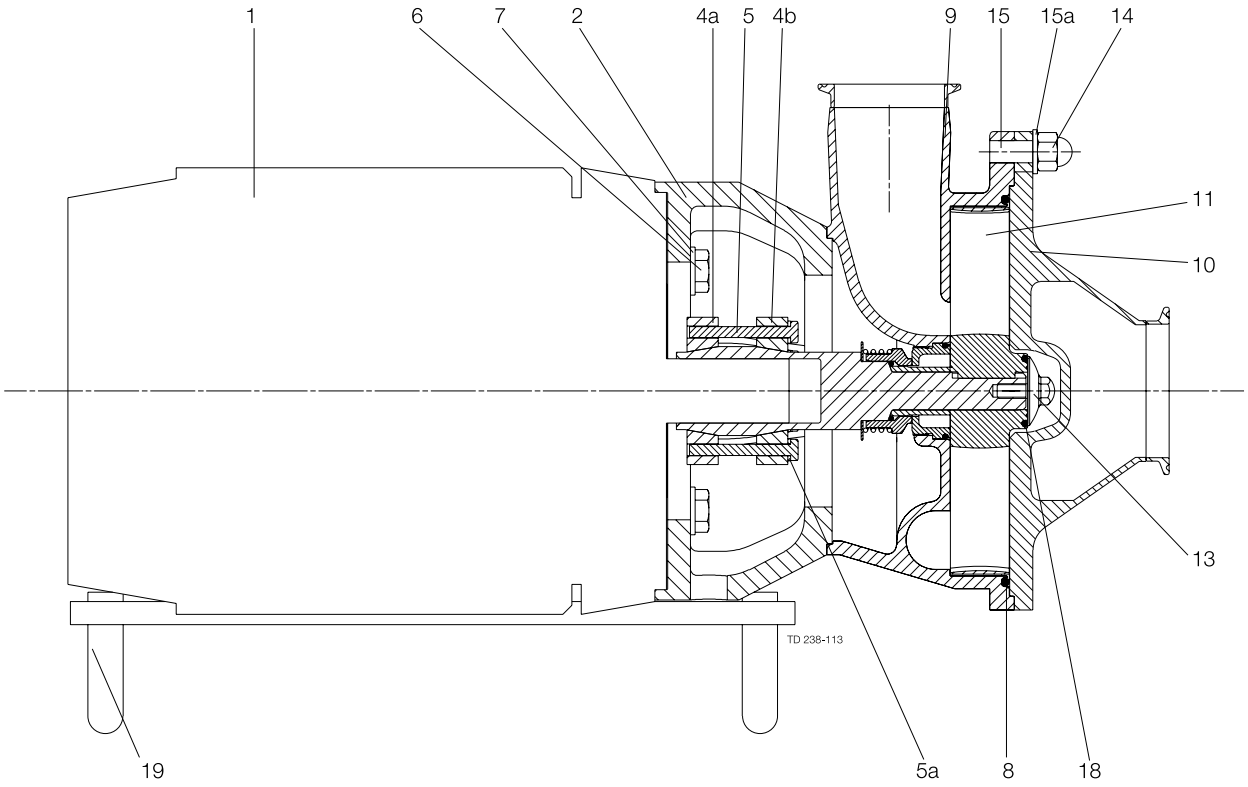


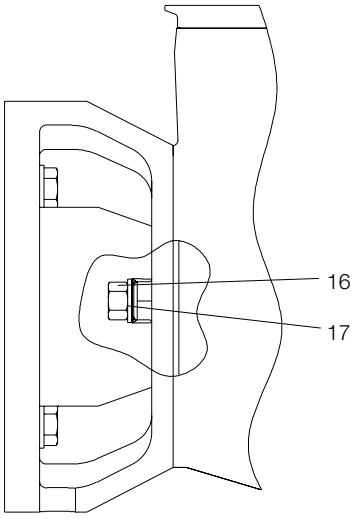


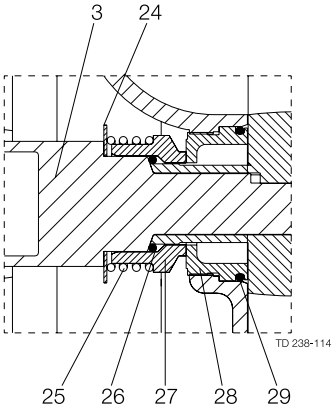


The drawings show MR-185US, -200US and include all items.

For further information see parts list section 6.3.







Shaft seal

The parts list include all items.

Parts List

Pos.	Qty.	Denomination
1	1	Motor 3 Hp
2	1	Bracket
3	1	Shaft
4	2	Screw
6	1	Bracket set
8■	1	O-ring
9	1	Pump casing
10	1	Casing cover
11	1	Impeller
13	1	Impeller screw
14	3	Cap nut
15	3	Stud bolt
15a	3	Washer
18■	1	O-ring for impellerscew
21	1	Thrower
40	2	Screw
41	2	Spring washer
45	4	Screw
46	4	Washer

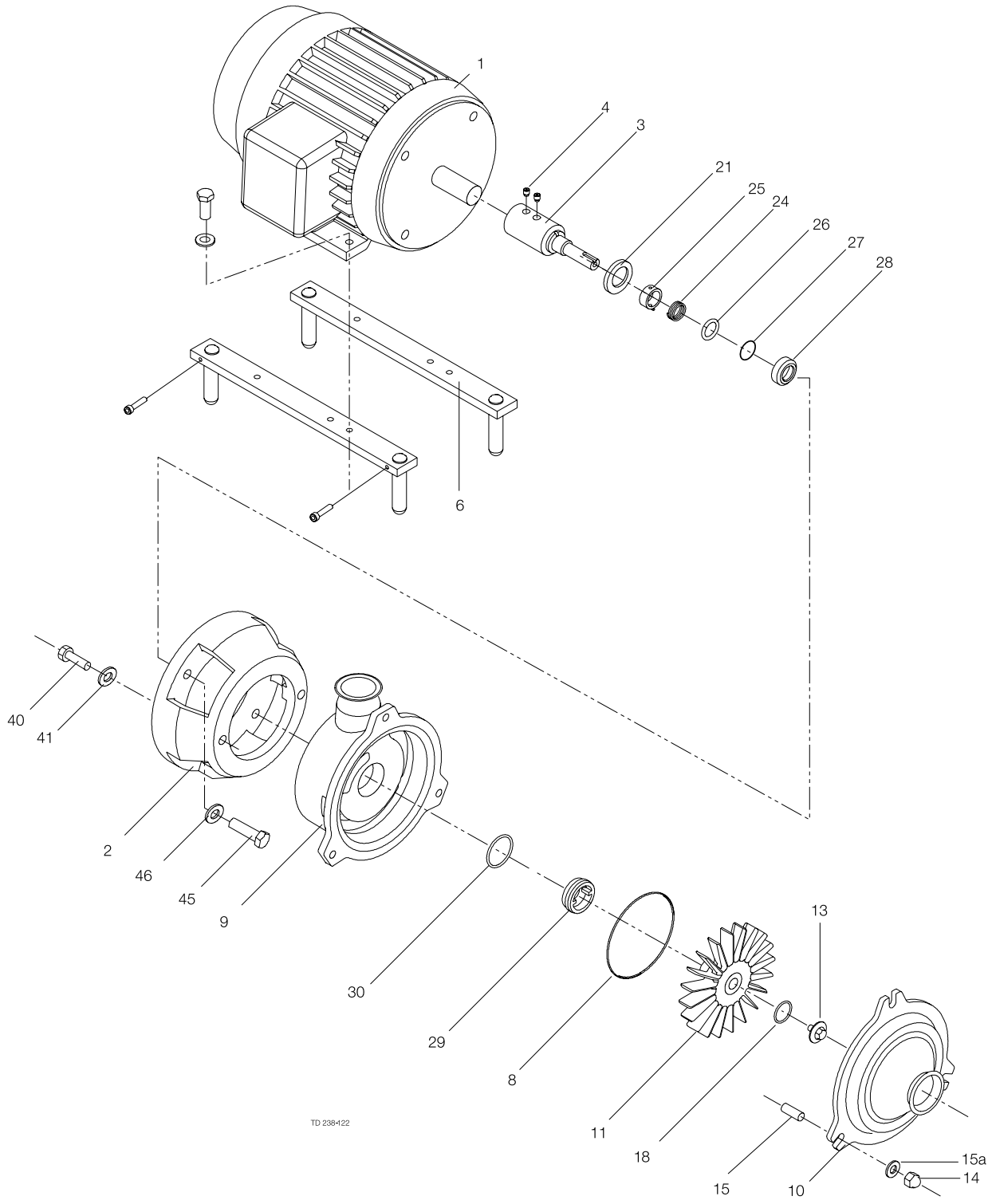
■ Shaft seal, complete, EPDM C/SS (Standard)

24	1	Spring
25	1	Spacer ring
26	1	Washer
27	1	O-ring
28	1	Rotating seal ring
29	1	Stationary seal ring
30	1	O-ring

Service Kits

Denomination ..... ■ C/SS
Single shaft seal
EPDM (Standard)..... 9911-92-1946
NBR 9911-92-1947
FPM 9911-92-1948

This page shows an exploded drawing of MR-166US. *The drawing includes all items of the pump.*



The parts list include all items.

Parts List

Pos.	Qty.	Denomination
1	1	Motor
2	1	Bracket
3	1	Shaft
4	1	Compression ring
5	6	Screw
5a	6	Washer
6	4	Screw
7	4	Washer
8■⊙	1	O-ring
9	1	Pump casing
10	1	Casing cover
11	1	Impeller
13	1	Impellerscrew
14	3	Cap nut
15	3	Screw
15a	3	Washer
16	2	Screw
17	2	Washer
24	1	Thrower
18■⊙	1	O-ring for impellerscew
19	1	Bracket set
■⊙ Shaft seal		
25	1	Spring
26	1	O-ring
27	1	Rotating seal ring
28	1	Stationary seal ring
29	1	O-ring

Service Kits

Denomination ..... ■ C/SS	⊙ SiC/SiC
Single Shaft seal	
EPDM (Standard)..... 9611-92-1949	9611-92-1952
NBR 9611-92-1950	9611-92-1953
FPM 9611-92-1951	9611-92-1954

Note: Service kits include mechanical seals with carbon/silicone carbide sealfaces

This page shows an exploded drawing of MR-185US, -200US.

The drawing includes all items of the pump.