

LS

Service instructions



Original service instructions

CONTENTS

	Page
1. General information	3
1.1 Hazard statements	3
1.2 Notes	3
2. Service tools	4
2.1 Special tools	4
2.2 Standard tools	4
2.3 Torque tools	4
3. Servicing the product	5
3.1 Contaminated pumps	5
3.2 Operating checks	5
3.3 Maintaining the product	5
4. Dismantling and assembling the product	6
4.1 General information	6
4.2 Dismantling the pump, with sleeve	6
4.3 Dismantling the pump, without sleeve	9
4.4 Assembling the pump, with sleeve	10
4.5 Assembling the pump, without sleeve	14
4.6 Replacing ring in the stuffing box, LS with sleeve	15
5. Alignment	16
5.1 Preliminary alignment	16
5.2 Final alignment	16
6. Taking the product out of operation	17
6.1 Short-term shutdown	17
6.2 Long-term shutdown	17
7. Identification	18
7.1 Nameplate	18
7.2 Type key	19
8. Standard components and material specifications	21
9. Sectional drawings	22
9.1 LS with sleeve, construction type 1	22
9.2 LS with sleeve, construction type 2	23
9.3 LS with sleeve, construction type 3	23
9.4 LS with sleeve, construction type 4	24
9.5 LS without sleeve, construction type 1	24
9.6 LS without sleeve, construction type 2	25
9.7 LS, typical end view, non-drive end	25
10. Exploded views	26
10.1 Coupling	26
10.2 LS with sleeve	27
10.3 LS without sleeve	35
11. Fault finding the product	42
12. Disposing of the product	43



Read this document before starting service work on the product. Installation and service work must comply with local regulations and accepted codes of good practice.

Observe the safety instructions in the installation and operating instructions for the product.

1. General information

1.1 Hazard statements

The symbols and hazard statements below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.



DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious personal injury.



WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious personal injury.



CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate personal injury.

The hazard statements are structured in the following way:



SIGNAL WORD

Description of hazard

Consequence of ignoring the warning.
- Action to avoid the hazard.

1.2 Notes

The symbols and notes below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.



Observe these instructions for explosion-proof products.



A blue or grey circle with a white graphical symbol indicates that an action must be taken.



A red or grey circle with a diagonal bar, possibly with a black graphical symbol, indicates that an action must not be taken or must be stopped.

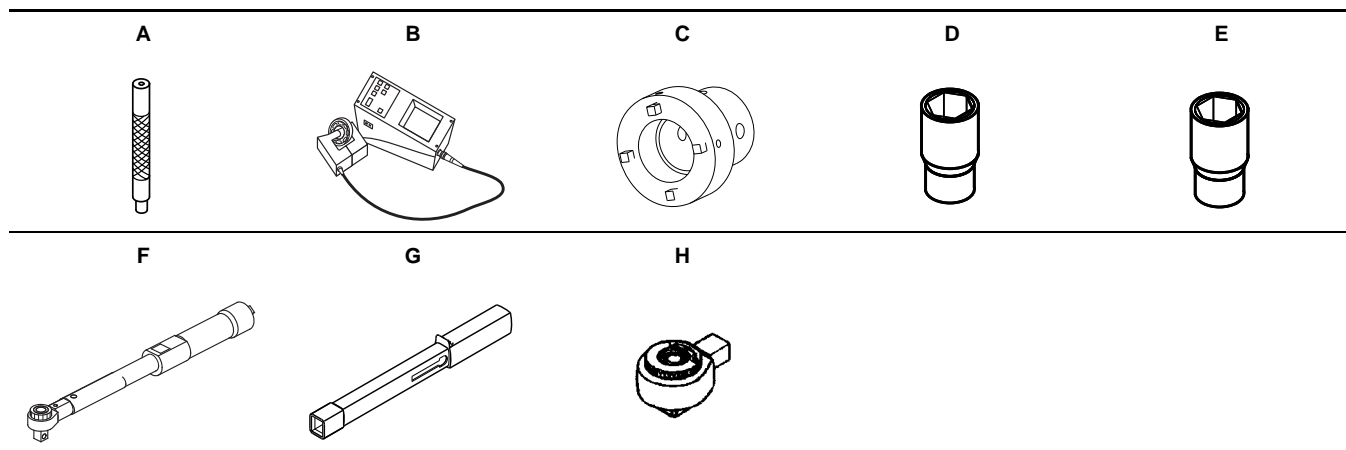


If these instructions are not observed, it may result in malfunction or damage to the equipment.



Tips and advice that make the work easier.

2. Service tools



2.1 Special tools

Pos.	Description	For pos.	Further information	Part number
A	Punch (brass)	54		SV0282
B	Bearing heating inductor (for assembly)	53, 54		-
C	Round nut tool	67b		

2.2 Standard tools

Pos.	Description	For pos.	Further information	Part number
D	Hexagon socket	26c, 26d, 114, 114a	1 - 1/2"	-
			1 - 5/16"	-
			1 - 1/8"	-
			15/16"	-
			3/4"	-
E	Octagon socket	17, 20, 20a, 20b, 20c, 20d, 20e, 20g	9/16"	-
			3/8"	-

2.3 Torque tools

Pos.	Description	For pos.	Further information	Part number
F	Torque wrench	D, E	200-800 Nm	SV2126
G	Torque wrench	H	9x12 mm - 4-20 Nm	SV2092
			9x12 mm - 20-100 Nm	SV0269
			14x18 mm - 40-200 Nm	SV0400
H	Ratchet insert tool	D, E	9x12 mm - 1/2"	SV0295
			14x18 mm	SV0401

2.3.1 Tightening torques

The position numbers in the following refer to section 8. *Standard components and material specifications* on page 21.

Pos.	Description	Quantity	Dimensions	Torque [Nm]			
				PN 10		PN 16	
				Dry	Lubricated	Dry	Lubricated
26c	Screw	6	1/2"-13, 1.25"L	75	45	102	61
26d		4	1/2"-13, 3.00"L	75	45	102	61
114		8	3/8"-16, 1.25"L	30	18	41	24
114a		8	5/16"-18, 1.25"L	16	11	23	14

3. Servicing the product

3.1 Contaminated pumps



CAUTION
Biological hazard

- Minor or moderate personal injury
- Flush the pump thoroughly with water and rinse the pump parts in water after dismantling.

The product will be classified as contaminated if it has been used for a liquid which is injurious to health or toxic.

If you request Grundfos to service the product, contact Grundfos with details about the liquid before returning the product for service. Otherwise, Grundfos can refuse to accept the product for service.

Any application for service must include details about the liquid. Clean the product in the best possible way before you return it. Costs of returning the product are to be paid by the customer.

3.2 Operating checks

1. Check the pump and pipes for leaks.



CAUTION
High sound pressure level

- Minor or moderate personal injury
- Use hearing protection.

2. Check and record the pressure gauge readings for future reference.
3. Check the differential pressure. If the differential pressure is lower than anticipated, the motor may be overloaded. We recommend that you install pressure gauges on the pump inlet and outlet flanges.
4. Measure the motor current consumption and compare the result with the rated current stated on the motor nameplate. In case of overload, throttle the outlet isolating valve or throttle valve until the motor is no longer overloaded.
5. Check the bearings for lubrication and temperature. Normal temperature is 70 °C (158 °F). The maximum temperature depends on the type of lubrication. See the lubricating plate on the pump.

Stop the pump immediately if you notice any defects.

Do not start the pump unless the defects have been remedied. See section 7. *Identification*. Report immediately to the supplier that you cannot remedy the defects.



The operating checks apply both during the startup procedure and when checking the pump during normal operation.

3.3 Maintaining the product

DANGER

Electric shock

- Death or serious personal injury
- Before starting work on the pump, make sure that the power supply has been switched off and that it cannot be accidentally switched on.



WARNING

Hot or cold surface

- Death or serious personal injury
- Pay attention to the direction of the vent hole, and ensure that the escaping water does not cause injury to persons or damage to the motor or other components.
 - In hot-water installations, pay special attention to the risk of injury caused by scalding hot water and hot surfaces.
 - In cold-liquid installations, pay special attention to the risk of injury caused by cold liquids and cold surfaces.



3.3.1 General information

Routine maintenance is essential to maintain the pump in a good condition.

A high degree of cleanliness must be maintained during all maintenance procedures.

3.3.2 Frequency of inspections

Carry out inspections in accordance with the maintenance table below.

Depending on operating and environmental conditions together with a comparison of previous inspections, the frequency of inspections may be altered to maintain satisfactory operation of the pump.

Every week	<ul style="list-style-type: none"> • Visually check for leaks. • Check for vibrations. • Hand test the bearing housing for any sign of temperature rise. • Check correct leaking from the stuffing boxes (approximately 40-60 drops per minute).
Every month	<ul style="list-style-type: none"> • Check the pump bearing temperature.
Every 6 months	<ul style="list-style-type: none"> • Check the shaft for scores. • Check the alignment of the pump and motor. • Check the fixing bolts and tighten, if necessary. • Check the coupling for wear.
Every year	<ul style="list-style-type: none"> • Check whether the grease in the pump bearings has hardened. • Check the rotating assembly for wear. • Check the wear ring clearances.

CAUTION

Sharp element

- Minor or moderate personal injury
- Wear protective gloves to protect yourself against sharp edges on the impeller and wear rings.



Between the regular maintenance inspections, be aware of signs of motor or pump trouble.

Common symptoms are listed in section 7. *Identification*.

Remedy any fault immediately and avoid costly repairs and shutdowns.

3.3.3 Lubrication

Grease specifications: See section *Ball bearing grease*.

Pump bearings

Pump bearings are lubricated before delivery.

We recommend relubricating intervals of 2000 operating hours. However, depending on duty conditions, this may vary.

To refill the bearings with fresh grease, follow this procedure:

1. Remove the bearing cap.
2. Add enough grease to fill up 1/3 of the ball bearing.
3. Note the quantity required.
4. Refit the bearing cap.

Grease quantity

Inlet size	Grease quantity [g]
DN 65 to DN 100	11
DN 125 to DN 150	17
DN 200 to DN 300	25
DN 350 to DN 450	50

Repeat this procedure the first three times. Based on the first three relubrications, determine the correct quantity of grease required.

For future relubrications, apply the established quantity of grease through the lubricating nipples. You do not have to remove the bearing caps.

For every 10,000 operating hours or every two years:

1. Remove the bearing caps from the pump.
2. Remove old grease.
3. Thoroughly clean the bearing caps.
4. Refill the bearings with fresh grease.
5. Refill the bearing caps completely with fresh grease.
6. Refit the bearing caps in accordance with the assembly instructions.
7. Start the pump briefly several times to distribute the grease in the bearings and to prevent overheating of the grease.



Do not overgrease.

Too much grease can cause overheating and premature bearing failure.

Motor bearings

Lubricate the motor bearings in accordance with the indications on the motor nameplate.

Ball bearing grease

Manufacturer	Lubricant
Shell	Gadus S2 V2202 ¹⁾
SKF	LGHP 2 ¹⁾
Exxon	Polyrex
Chevron	SRI grease NLGI 2 Black pearl NLGI 2
Philips	Polytac
Texaco	Polystar RB

¹⁾ Grundfos recommends Shell Gadus S2 V2202 or SKF LGHP 2 grease for relubrication.

Grid coupling

A grid coupling must be regreased at intervals. Normally, the interval is one year, but it can be shorter if the environment is aggressive or the operating conditions are harsh. Use the same grease for the coupling as for the ball bearings. See section *Ball bearing grease*.

Proceed like this:

1. Remove the coupling guards.
2. Remove the two lubricating plugs.
3. Pump grease into one of the lubricating holes to push the old grease out of the opposite hole.
4. Keep pumping until the fresh grease comes out.
5. Refit and fasten the two plugs.
6. Mount the coupling guards again.

4. Dismantling and assembling the product

4.1 General information

Position numbers

Pump parts are indicated by numbers and refer to sections 8. *Standard components and material specifications* and 9. *Sectional drawings*.

Service tools are indicated by letters and refer to section 2. *Service tools*.

Before dismantling

- Disconnect the supply voltage to the motor.
- Close the isolating valves, if fitted, to avoid draining the system.
- Remove the electric cable in accordance with local regulations.

Before assembly

- Clean and check all parts.
- Replace defective parts by new parts.
- Order the necessary service kits.
- Always replace the gaskets and O-rings when the pump is serviced.

During assembly

Lubricate and tighten the screws and nuts to the correct torque. See section 2.3.1 *Tightening torques*.

4.2 Dismantling the pump, with sleeve

4.2.1 LS with sleeve, construction type 1

The position numbers in the following refer to section 9.1 *LS with sleeve, construction type 1* on page 22.

Removing the motor

1. Remove the coupling guard.
2. Remove the screws and nuts from the coupling halves.
3. Carefully loosen and remove the spring using a screwdriver.
4. Remove the screws holding the motor on the base frame.
5. Lift off the motor.
6. Loosen the set screws in the coupling flange of the pump.
7. Pull the coupling flange off the pump shaft using a puller.

Removing the bearings and shaft seals, non-drive end

1. Remove the four screws (114a) holding the bearing cover (113d).
2. Remove the bearing cover (113d) and gasket (113e).
3. Loosen the set screw in the bearing snap ring (54).
4. Loosen the bearing snap ring (54) by moving it against the direction of rotation.
5. Remove any marks from the set screws on the shaft non-drive end (51).
6. Remove the screws (114).
7. Pull the seal housing (124) off the shaft (51) using a puller, and then remove the gasket (109b).
8. Pull the spring, washer and rotary shaft seal part (105) off the shaft (51).
9. Pull the bearing (54) out of the seal housing (124).
10. Remove the stationary shaft seal part (105). Use a punch, if necessary.

Removing the bearings and shaft seals, drive end

1. Remove the key (11a).
2. Remove the four screws (114a) holding the bearing cover (113c).
3. Remove the bearing cover (113c) and gasket (113e).
4. Loosen the set screw in the bearing snap ring (53).
5. Loosen the bearing snap ring (53) by moving it against the direction of rotation.
6. Remove any marks from the set screws on the shaft drive end (51).
7. Remove the screws (114).
8. Pull the seal housing (124) off the shaft (51) using a puller, and then remove the gasket (109b).
9. Pull the spring, washer and rotary shaft seal part (105) off the shaft (51).
10. Pull the bearing (53) out of the seal housing (124).
11. Remove the stationary shaft seal part (105). Use a punch, if necessary.

Removing the upper pump housing

1. Loosen the screws (26c), and remove them.
2. Loosen the screws (26d), and remove them (only pump type LS 65-50-330).
3. Loosen the upper pump housing by means of a jacking screw (inch threads).
4. Lift off the upper pump housing (6a).

Removing the shaft, impeller and gasket

1. Lift the shaft (51), including the impeller (49) and wear rings (45b), free of the lower pump housing (6b).
2. Remove the wear rings (45b).
3. Remove the gasket (72a) from the pump housing (6b), and clean the packing face.

Removing the impeller

1. Remove the impeller nut (67a).
2. Push the shaft until the key (11) is free of the impeller (49).
3. Pull the shaft (51) out of the impeller (49), and remove it.

4.2.2 LS with sleeve, construction type 2

The position numbers in the following refer to section 9.2 *LS with sleeve, construction type 2* on page 23.

Removing the motor

1. Remove the coupling guard.
2. Remove the screws and nuts from the coupling halves.
3. Carefully loosen and remove the spring using a screwdriver.
4. Remove the screws holding the motor on the base frame.
5. Lift off the motor.
6. Loosen the set screws in the coupling flange of the pump.
7. Pull the coupling flange off the pump shaft using a puller.

Removing the bearings and shaft seals, non-drive end

1. Remove the four screws (114a) holding the bearing cover (113d).
2. Remove the bearing cover (113d) and gasket (113e).
3. Loosen the set screw in the bearing snap ring (54).
4. Loosen the bearing snap ring (54) by moving it against the direction of rotation.
5. Remove any marks from the set screws on the shaft non-drive end (51).
6. Remove the screws (114) or the nuts (36).
7. Pull the seal housing (124) off the shaft (51) using a puller, and then remove the slinger (79) and O-ring (109).
8. Pull the spring, washer and rotary shaft seal part (105) off the shaft (51).
9. Remove the slinger (79), and then pull the bearing (54) out of the seal housing (124).
10. Remove the stationary shaft seal part (105). Use a punch, if necessary.

Removing the bearings and shaft seals, drive end

1. Remove the key (11a).
2. Remove the four screws (114a) holding the bearing cover (113c).
3. Remove the bearing cover (113c) and gasket (113e).
4. Loosen the set screw in the bearing snap ring (53).
5. Loosen the bearing snap ring (53) by moving it against the direction of rotation.
6. Remove any marks from the set screws on the shaft drive end (51).
7. Remove the screws (114) or the nuts (36).
8. Pull the seal housing (124) off the shaft (51) using a puller, and then remove the slinger (79) and O-ring (109).
9. Pull the spring, washer and rotary shaft seal part (105) off the shaft (51).
10. Remove the slinger (79), and then pull the bearing (54) out of the seal housing (124).
11. Remove the stationary shaft seal part (105). Use a punch, if necessary.

Removing the upper pump housing

1. Loosen the screws (26c, 26d), and remove them.
2. Fit the screws (26c) in the dismantling holes, thereby loosening the rest of the pump housing (6a).
3. Lift off the upper pump housing (6a).
4. Remove the screws (26c) from the dismantling holes, and then knock up the guide pins so that they are not damaged.

Removing the shaft, impeller and gasket

1. Lift the shaft (51), including the impeller (49) and wear rings (45b), free of the lower pump housing (6b).
2. Remove the wear rings (45b).
3. Remove the snap ring (65).
4. Remove the gasket (72a) from the pump housing (6b), and clean the packing face.

Removing the impeller

1. Remove the shaft sleeve (116a, 116b).
2. Remove the shaft sleeve O-ring (66).
3. Push the shaft until the key (11) is free of the impeller (49).
4. Pull the shaft (51) out of the impeller (49), and remove it.

4.2.3 LS with sleeve, construction type 3

The position numbers in the following refer to section 9.3 *LS with sleeve, construction type 3* on page 23.

Removing the motor

1. Remove the coupling guard.
2. Remove the screws and nuts from the coupling halves.
3. Carefully loosen and remove the spring using a screwdriver.
4. Remove the screws holding the motor on the base frame.
5. Lift off the motor.
6. Loosen the set screws in the coupling flange of the pump.
7. Pull the coupling flange off the pump shaft using a puller.

Removing the bearings and shaft seals, non-drive end

1. Remove the four screws (114a) holding the bearing cover (113d).
2. Remove the bearing cover (113d) and gasket (113e).
3. Loosen the set screw in the bearing snap ring (54) (only pump type LS 100-80-241).
4. Loosen the bearing snap ring (54) by moving it against the direction of rotation (only pump type LS 100-80-241).
5. Remove any marks from the set screws on the shaft non-drive end (51) (only pump type LS 100-80-241).
6. Remove the snap ring (54d).
7. Remove the screws (114).
8. Pull the seal housing (124) off the shaft (51) using a puller, and then remove the slinger (79) and O-ring (109).
9. Pull the spring, washer and rotary shaft seal part (105) off the shaft (51).
10. Pull the bearing (54) out of the seal housing (124).
11. Remove the stationary shaft seal part (105). Use a punch, if necessary.

Removing the bearings and shaft seals, drive end

1. Remove the key (11a).
2. Remove the four screws (114a) holding the bearing cover (113c).
3. Remove the bearing cover (113c) and gasket (113e).
4. Remove the screws (114).
5. Pull the seal housing (124) off the shaft (51) using a puller, and then remove the slinger (79) and O-ring (109).
6. Pull the spring, washer and rotary shaft seal part (105) off the shaft (51).
7. Pull the bearing (53) out of the seal housing (124).
8. Remove the stationary shaft seal part (105). Use a punch, if necessary.

Removing the upper pump housing

1. Loosen the screws (26c, 26d), and remove them.
2. Remove the vent screw (17), and then fit a lifting eye in the thread.
3. Fit the screws in the dismantling holes, thereby loosening the rest of the pump housing (6a).
4. Lift off the upper pump housing (6a).
5. Remove the screws (26c) from the dismantling holes, and then knock up the guide pins so that they are not damaged.

Removing the shaft, impeller and gasket

1. Lift the shaft (51), including the impeller (49) and wear rings (45b), free of the lower pump housing (6b).
2. Remove the wear rings (45b).
3. Remove the snap ring (65).
4. Remove the gasket (72a) from the pump housing (6b), and clean the packing face.

Removing the impeller

1. Loosen and remove the impeller nut (67a, 67b).
2. Loosen the set screws (116e), and remove the shaft sleeve (116a, 116b).
3. Remove the shaft seal O-ring (66).
4. Push the shaft until the key (11) is free of the impeller (49).
5. Pull the shaft (51) out of the impeller (49), and remove it.

4.2.4 LS with sleeve, construction type 4

The position numbers in the following refer to section 9.4 *LS with sleeve, construction type 4* on page 24.

Removing the motor

1. Remove the coupling guard.
2. Remove the screws and nuts from the coupling halves.
3. Carefully loosen and remove the spring using a screwdriver.
4. Remove the screws holding the motor on the base frame.
5. Lift off the motor.
6. Loosen the set screws in the coupling flange of the pump.
7. Pull the coupling flange off the pump shaft using a puller.

Removing the bearings and shaft seals, non-drive end

1. Remove the four screws (114a) holding the bearing cover (113d).
2. Remove the bearing cover (113d) and gasket (113e).
3. Remove the snap ring (54d) and spacer ring (54c).
4. Remove the screws (114b).
5. Loosen the bearing housing (113) using expansion bolts.
6. Pull the bearing housing (113) off the shaft (51).
7. Pull the bearing (54) and spacer ring (54c) out of the bearing housing (113).
8. Remove the lip seal (113f). Use a punch, if necessary.
9. Remove the slinger (79).
10. Remove the screws (58a).
11. Remove the seal cover (58).
12. Remove the gasket (110a) or the O-ring (110).
13. Remove the stationary shaft seal part (105). Use a punch, if necessary.
14. Remove the seal housing screws (114).
15. Loosen the seal housing (124) using expansion bolts.
16. Remove the seal housing (124).
17. Remove the O-ring (109, 109a).
18. Pull the spring, washer and rotary shaft seal part (105) off the shaft (51).

Removing the bearings and shaft seals, drive end

1. Remove the key (11a).
2. Remove the four screws (114a) holding the bearing cover (113c).
3. Remove the bearing cover (113c) and gasket (113e).
4. Remove the screws (114b).
5. Loosen the bearing housing (113) using expansion bolts.
6. Pull the bearing housing (113) off the shaft (51).
7. Pull the bearing (54) out of the bearing housing (113).
8. Remove the lip seal (113f). Use a punch, if necessary.
9. Remove the slinger (79).
10. Remove the screws (58a).
11. Remove the seal cover (58).
12. Remove the gasket (110a) or the O-ring (110).
13. Remove the stationary shaft seal part (105). Use a punch, if necessary.
14. Remove the seal housing screws (114).
15. Loosen the seal housing (124) using expansion bolts.
16. Remove the seal housing (124).
17. Remove the O-ring (109, 109a).
18. Pull the spring, washer and rotary shaft seal part (105) off the shaft (51).

Removing the upper pump housing

1. Loosen the screws (26c, 26d), and remove them.
2. Fit the screws in the dismantling holes, thereby loosening the rest of the pump housing (6a).
3. Lift off the upper pump housing (6a). Use lifting straps on the lifting brackets of the pump housing.
4. Remove the screws (26c) from the dismantling holes, and then knock up the guide pins so that they are not damaged.

Removing the shaft, impeller and gasket

1. Lift the shaft (51), including the impeller (49) and wear rings (45a, 45b or 45c), free of the lower pump housing (6b).
2. Remove the wear rings (45a, 45b or 45c).
3. Remove the snap ring (65) (only pump type LS 200-150-483).
4. Remove the gasket (72a) from the pump casing (6b), and clean the packing face.

Removing the impeller

1. Loosen and remove the impeller nut (67a, 67b).
2. Loosen the set screws (116e), and remove the outer shaft sleeve (116d) and inner shaft sleeve (116c) or the shaft sleeve (116).
3. Remove the shaft seal O-ring (66).
4. Push the shaft until the key (11) is free of the impeller (49).
5. Pull the shaft (51) out of the impeller (49), and remove it.

4.3 Dismantling the pump, without sleeve**4.3.1 LS without sleeve, construction type 1**

The position numbers in the following refer to section 9.5 *LS without sleeve, construction type 1* on page 24.

Removing the motor

1. Remove the coupling guard.
2. Remove the screws and nuts from the coupling halves.
3. Carefully loosen and remove the spring using a screwdriver.
4. Remove the screws holding the motor on the base frame.
5. Lift off the motor.
6. Loosen the set screws in the coupling flange of the pump.
7. Pull the coupling flange off the pump shaft using a puller.

Removing the bearings and shaft seals, non-drive end

1. Remove the four screws (114a) holding the bearing cover (113d).
2. Remove the bearing cover (113d) and gasket (113e).
3. Loosen the round nut (54e).
4. Remove the round nut (54e) and the washer (54c) from the shaft non-drive end.
5. Remove the screws (114).
6. Pull the seal housing (124) off the shaft (51) using a puller, and then remove the gasket (109b).
7. Pull the spring, washer and rotary shaft seal part (105) off the shaft (51).
8. Pull the bearing (54) out of the seal housing (124).
9. Remove the stationary shaft seal part (105). Use a punch, if necessary.

Removing the bearings and shaft seals, drive end

1. Remove the key (11a).
2. Remove the four screws (114a) holding the bearing cover (113c).
3. Remove the bearing cover (113c) and gasket (113e).
4. Remove the screws (114).
5. Pull the seal housing (124) off the shaft (51) using a puller, and then remove the gasket (109b).
6. Pull the spring, washer and rotary shaft seal part (105) off the shaft (51).
7. Pull the bearing (53) out of the seal housing (124).
8. Remove the stationary shaft seal part (105). Use a punch, if necessary.

Removing the upper pump housing

1. Loosen the screws (26c), and remove them.
2. Loosen the screws (26d), and remove them (only pump type LS 65-50-330).
3. Loosen the upper pump housing by means of a jacking screw (inch threads).
4. Lift off the upper pump housing (6a).

Removing the shaft, impeller and gasket

1. Lift the shaft (51), including the impeller (49) and wear rings (45b), free of the lower pump housing (6b).
2. Remove the wear rings (45b).
3. Remove the gasket (72a) from the pump housing (6b), and clean the packing face.

Removing the impeller

1. Remove the impeller nut (67b).
2. Push the shaft until the key (11) is free of the impeller (49).
3. Pull the shaft (51) out of the impeller (49), and remove it.

4.3.2 LS without sleeve, construction type 2

The position numbers in the following refer to section 9.6 *LS without sleeve, construction type 2* on page 25.

Removing the motor

1. Remove the coupling guard.
2. Remove the screws and nuts from the coupling halves.
3. Carefully loosen and remove the spring using a screwdriver.
4. Remove the screws holding the motor on the base frame.
5. Lift off the motor.
6. Loosen the set screws in the coupling flange of the pump.
7. Pull the coupling flange off the pump shaft using a puller.

Removing the bearings and shaft seals, non-drive end

1. Remove the four screws (114a) holding the bearing cover (113d).
2. Remove the bearing cover (113d) and gasket (113e).
3. Loosen the round nut (54e). Remove the round nut (54e) and the washer (54c) from the shaft non-drive end.
4. Remove the screws (114b).
5. Loosen the bearing housing (113) using expansion bolts.
6. Pull the bearing housing (113) off the shaft (51).
7. Pull the bearing (54) and tab washer (54d) out of the bearing housing (113).
8. Remove the lip seal (113f). Use a punch, if necessary.
9. Remove the slinger (79).
10. Remove the screws (58a).
11. Remove the seal cover (58).
12. Remove the gasket (110a) or the O-ring (110).
13. Remove the stationary shaft seal part (105). Use a punch, if necessary.
14. Remove the seal housing screws (114).
15. Loosen the seal housing (124) using expansion bolts.
16. Remove the seal housing (124).
17. Remove the O-ring (109, 109a).
18. Pull the rotary shaft seal part (105) off the shaft (51).

Removing the bearings and shaft seals, drive end

1. Remove the key (11a).
2. Remove the four screws (114a) holding the bearing cover (113c).
3. Remove the bearing cover (113c) and gasket (113e).
4. Remove the screws (114b).
5. Loosen the bearing housing (113) using expansion bolts.
6. Pull the bearing housing (113) off the shaft (51).
7. Pull the bearing (54) out of the bearing housing (113).
8. Remove the lip seal (113f). Use a punch, if necessary.
9. Remove the slinger (79).
10. Remove the screws (58a).
11. Remove the seal cover (58).
12. Remove the gasket (110a) or the O-ring (110).
13. Remove the stationary shaft seal part (105). Use a punch, if necessary.
14. Remove the seal housing screws (114).
15. Loosen the seal housing (124) using expansion bolts.
16. Remove the seal housing (124).
17. Remove the O-ring (109, 109a).
18. Pull the rotary shaft seal part (105) off the shaft (51).

Removing the upper pump housing

1. Loosen the screws (26c, 26d), and remove them.
2. Fit the screws in the dismantling holes, thereby loosening the rest of the pump housing (6a).
3. Lift off the upper pump housing (6a). Use lifting straps on the lifting brackets of the pump housing.
4. Remove the screws (26c) from the dismantling holes, and then knock up the guide pins so that they are not damaged.

Removing the shaft, impeller and gasket

1. Lift the shaft (51), including the impeller (49) and wear rings (45a, 45b or 45c), free of the lower pump housing (6b).
2. Remove the wear rings (45a, 45b or 45c).
3. Remove the snap ring (65) (only pump type LS 200-150-483).
4. Remove the gasket (72a) from the pump housing (6b), and clean the packing face.

Removing the impeller

1. Loosen and remove the impeller nut (67b).
2. Push the shaft until the key (11) is free of the impeller (49).
3. Pull the shaft (51) out of the impeller (49), and remove it.

4.4 Assembling the pump, with sleeve

4.4.1 LS with sleeve, construction type 1

Fitting the impeller

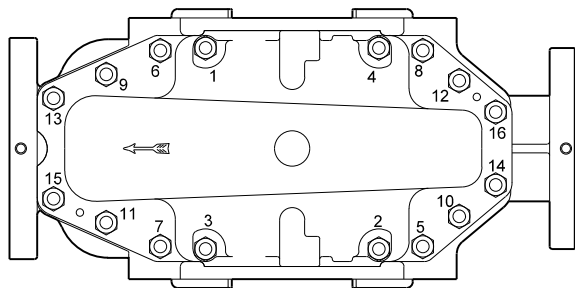
1. Fit the shaft (51) in the impeller (49).
2. Fit the impeller nut (67a) on the shaft, and tighten by hand.
3. Centre the shaft in the impeller (49) by measuring from the impeller hub to the shoulder on each side of the shaft (51).
4. Tighten the impeller nut (67a).

Fitting the gaskets, impeller and shaft

1. Draw the outline of the old gasket (72a) on a new gasket material (gasket thickness 0.8 mm), make holes for the staybolts, and coarsely cut out the gasket.
2. Fit the guide screws in the lower pump housing (6b).
3. Fit the gasket (72a), and cut it out.
4. Fit the wear rings (45b) on the impeller (49), and check that they can rotate freely.
5. Lift the shaft, impeller and wear rings home in the pump housing. Make sure that the pins at the bottom of the pump housing engage with the holes of the wear rings.

Fitting the upper pump housing

1. Clean the packing face of the upper pump housing (6a), and fit the pump housing.
2. Knock the guide pins down into the lower pump housing (6b).
3. Remove the guide screws in the lower pump housing (6b).
4. Fit the screws (26d), and tighten them, but leave loose, in the order shown in fig. 1 (only pump type LS 65-50-330).
5. Fit the screws (26c), and tighten them, but leave loose, in the order shown in fig. 1.



TM04 1865 1208

Fig. 1 Tightening order in principle for screws pos. 26c

6. Tighten the screws (26d) to the correct torque. See section 2.3.1 *Tightening torques*. The tightening order is shown in fig. 1 (only pump type LS 65-50-330).
7. Tighten the screws (26c) to the correct torque. See section 2.3.1 *Tightening torques*. The tightening order is shown in fig. 1.
8. Check that the shaft can rotate freely.
9. Remove excess gasket material.

Fitting the bearings and shaft seals

1. Clean the O-ring on the shaft seal rotary part (105). Then fit it along with the washer and spring. Start at the non-drive end.
2. Press the rotary shaft seal part (105) home in the seal housing (124).
3. Fit the seal housing (124), gasket (113e) and slinger (79). Note that the slinger must be placed between the stationary shaft seal part and the bearing.
4. Fit the screws (114). Cross-tighten to the correct torque. See section 2.3.1 *Tightening torques*.
5. Make sure to polish off any burrs on the shaft drive end.
6. Repeat steps 1 to 4 for the drive end.
7. Check that the shaft can rotate freely.
8. Lubricate the bearing (54), and press it home in the seal housing (124). For lubricant, see section *Ball bearing grease*.
9. Fit the bearing snap ring (54) by moving it with the direction of rotation. Then tighten the two set screws.
10. Lubricate the bearing (54). For lubricant, see section 2. *Service tools*.
11. Fit the gasket (113e), bearing cover (113d) and screws (114a). Cross-tighten to the correct torque. See section 2.3.1 *Tightening torques*.
12. Fit the bearing snap ring (53) by moving it with the direction of rotation. Then tighten the two set screws.
13. Lubricate the bearing (53). For lubricant, see section *Ball bearing grease*.
14. Fit the gasket (113e), bearing cover (113c) and screws (114a). Cross-tighten to the correct torque. See section 2.3.1 *Tightening torques*.
15. Check that the shaft can rotate freely.
16. Fit the key (11a).

4.4.2 LS with sleeve, construction type 2

Fitting the impeller

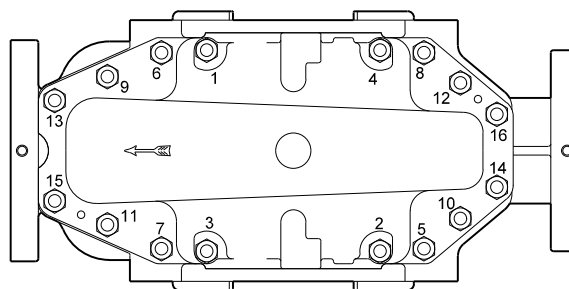
1. Fit the shaft (51) in the impeller (49).
2. Fit the O-ring (66) in the removed shaft sleeve (116a, 116b).
3. Fit the removed sleeve (116a or 116b) on the shaft, and tighten by hand.
4. Centre the shaft in the impeller (49) by measuring from the impeller hub to the shoulder on each side of the shaft (51).
5. Tighten the shaft sleeve (116a or 116b).

Fitting the gaskets, impeller and shaft

1. Draw the outline of the old gasket (72a) on a new gasket material (gasket thickness 0.8 mm), make holes for the staybolts, and coarsely cut out the gasket.
2. Fit the guide screws in the lower pump housing (6b).
3. Fit the gasket (72a), and cut it out.
4. Fit the snap ring (65).
5. Fit the wear rings (45b) on the impeller (49), and check that they can rotate freely.
6. Lift the shaft, impeller and wear rings home in the pump housing. Make sure that the pins at the bottom of the pump housing engage with the holes of the wear rings.

Fitting the upper pump housing

1. Clean the packing face of the upper pump housing (6a), and fit the pump housing.
2. Knock the guide pins down into the lower pump housing (26b).
3. Remove the guide screws in the lower pump housing (6b).
4. Fit the screws (26c, 26d), and tighten them, but leave loose, in the order shown in fig. 2.



TM04 1865 1208

Fig. 2 Tightening order in principle for screws pos. 26c

5. Tighten the screws (26c, 26d) to the correct torque. See section 2.3.1 *Tightening torques*. The tightening order is shown in fig. 2.
6. Check that the shaft can rotate freely.
7. Remove excess gasket material.

Fitting the bearings and shaft seals

1. Clean the O-ring on the shaft seal rotary part (105). Then fit it along with the washer and spring. Start at the non-drive end.
2. Press the rotary shaft seal part (105) home in the seal housing (124).
3. Fit the O-ring (109) on the seal housing (124).
4. Fit the seal housing (124) and the slinger (79). Note that the slinger must be placed between the stationary shaft seal part and the bearing.
5. Fit the screws (114) or the nuts (36). Cross-tighten to the correct torque. See section 2.3.1 *Tightening torques*.
6. Make sure to polish off any burrs on the shaft drive end.
7. Repeat steps 1 to 5 for the drive end.
8. Check that the shaft can rotate freely.
9. Lubricate the bearing (54), and press it home in the seal housing (124). For lubricant, see section *Ball bearing grease*.
10. Fit the bearing snap ring (54) by moving it with the direction of rotation. Then tighten the two set screws.
11. Lubricate the bearing (54). For lubricant, see section *Ball bearing grease*.
12. Fit the gasket (113e), bearing cover (113d) and screws (114a). Cross-tighten to the correct torque. See section 2.3.1 *Tightening torques*.
13. Fit the bearing snap ring (53) by moving it with the direction of rotation. Then tighten the two set screws.
14. Lubricate the bearing (53). For lubricant, see section *Ball bearing grease*.
15. Fit the gasket (113e), bearing cover (113c) and screws (114a). Cross-tighten to the correct torque. See section 2.3.1 *Tightening torques*.
16. Check that the shaft can rotate freely.
17. Fit the key (11a).

4.4.3 LS with sleeve, construction type 3

Fitting the impeller

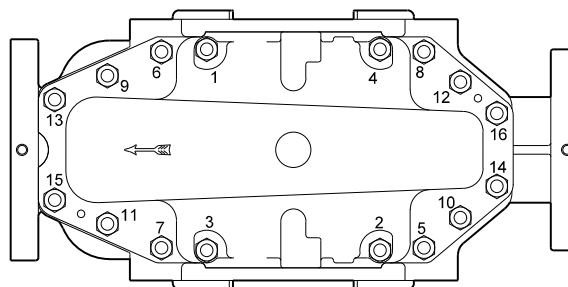
1. Fit the shaft (51) in the impeller (49).
2. Fit the O-ring (66) in the removed shaft sleeve (116a, 116b).
3. Fit the removed shaft sleeve (116a, 116b) on the shaft.
4. Fit and tighten the impeller nut (67a, 67b).
5. Centre the shaft in the impeller (49) by measuring from the impeller hub to the shoulder on each side of the shaft (51).
6. Tighten the two set screws (116e).

Fitting the gaskets, impeller and shaft

1. Draw the outline of the old gasket (72a) on a new gasket material (gasket thickness 0.8 mm), make holes for the staybolts, and coarsely cut out the gasket.
2. Fit the guide screws in the lower pump housing (6b).
3. Fit the gasket (72a), and cut it out.
4. Fit the snap ring (65).
5. Fit the wear rings (45b) on the impeller (49), and check that they can rotate freely.
6. Lift the shaft, impeller and wear rings home in the pump housing. Make sure that the slits at the side of the pump housing engage with the pins (24) in the wear rings (45c).

Fitting the upper pump housing

1. Clean the packing face of the upper pump housing (6a), and fit the pump housing.
2. Knock the guide pins down into the lower pump housing (26b).
3. Remove the guide screws in the lower pump housing (6b).
4. Remove the eyebolt, and then fit the vent screw (17).
5. Fit the screws (26c, 26d), and tighten them, but leave loose, in the order shown in fig. 3.



TM04 1865 1208

Fig. 3 Tightening order in principle for screws pos. 26c

6. Tighten the screws (26c, 26d) to the correct torque. See section 2.3.1 *Tightening torques*. The tightening order is shown in fig. 3.
7. Check that the shaft can rotate freely.
8. Remove excess gasket material.

Fitting the bearings and shaft seals

1. Clean the O-ring on the shaft seal rotary part (105). Then fit it along with the washer and spring. Start at the non-drive end.
2. Press the stationary shaft seal part (105) home in the seal housing (124) (only pump type LS 100-80-241).
3. Fit and cross-tighten the nuts (58a) (only pump type LS 100-80-241).
4. Fit the O-ring (109) on the seal housing (124).
5. Fit the seal housing (124) and the slinger (79). Note that the slinger must be placed between the stationary shaft seal part and the bearing.
6. Fit the screws (114). Cross-tighten to the correct torque. See section 2.3.1 *Tightening torques*.
7. Make sure to polish off any burrs on the shaft drive end.
8. Repeat steps 1 to 6 for the drive end.
9. Check that the shaft can rotate freely.
10. Lubricate the bearing (54), and press it home in the seal housing (124). For lubricant, see section *Ball bearing grease*.
11. Fit the bearing snap ring (54d) (not pump type LS 100-80-241).
12. Fit the bearing snap ring (54) by moving it with the direction of rotation. Then tighten the two set screws (only pump type LS 100-80-241).
13. Lubricate the bearing (54). For lubricant, see section *Ball bearing grease*.
14. Fit the gasket (113e), bearing cover (113d) and screws (114a). Cross-tighten to the correct torque. See section 2.3.1 *Tightening torques*.
15. Fit the bearing snap ring (53) by moving it with the direction of rotation. Then tighten the two set screws (only pump type LS 100-80-241).
16. Lubricate the bearing (53). For lubricant, see section *Ball bearing grease*.
17. Fit the gasket (113e), bearing cover (113c) and screws (114a). Cross-tighten to the correct torque. See section 2.3.1 *Tightening torques*.
18. Check that the shaft can rotate freely.
19. Fit the key (11a).

4.4.4 LS with sleeve, construction type 4

Fitting the impeller

1. Fit the shaft (51) in the impeller (49).
2. Centre the shaft in the impeller (49) by measuring from the impeller hub to the shoulder on each side of the shaft (51).
3. Fit the inner shaft sleeve (116c) (not pump type LS 200-150-508 and LS 200-150-483).
4. Fit the O-ring (66) in the removed shaft sleeve (116d or 116).
5. Fit and tighten the impeller nut (67a, 67b).
6. Tighten the two set screws (116e).

Fitting the gaskets, impeller and shaft

1. Draw the outline of the old gasket (72a) on a new gasket material (gasket thickness 0.8 mm), make holes for the staybolts, and coarsely cut out the gasket.
2. Fit the guide screws in the lower pump housing (6b).
3. Fit the gasket (72a), and cut it out.
4. Fit the snap ring (65) (only pump type LS 200-150-483).
5. Fit the wear rings (45a, 45b or 45c) on the impeller (49), and check that they can rotate freely.
6. Lift the shaft, impeller and wear rings home in the pump housing. Make sure that the slits at the side of the pump housing engage with the pins (24) in the wear rings (45c) (not pump type LS 200-150-508 and LS 200-150-483).
7. Lift the shaft, impeller and wear rings home in the pump housing. Make sure that the pins at the bottom of the pump housing engage with the holes in the wear rings (only pump type LS 200-150-508 and LS 200-150-483).

Fitting the upper pump housing

1. Clean the packing face of the upper pump housing (6a), and fit the pump housing.
2. Knock the guide pins down into the lower pump housing (26b).
3. Remove the guide screws in the lower pump housing (6b).
4. Fit the screws (26c, 26d), and tighten them, but leave loose, in the order shown in fig. 4.

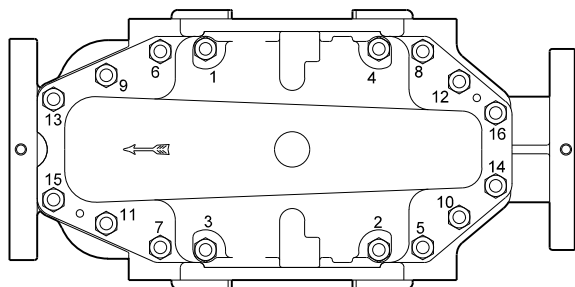


Fig. 4 Tightening order in principle for screws pos. 26c

5. Tighten the screws (26c, 26d) to the correct torque. See section 2.3.1 *Tightening torques*. The tightening order is shown in fig. 4.
6. Check that the shaft can rotate freely.
7. Remove excess gasket material.

Fitting the bearings and shaft seals

1. Clean the O-ring on the shaft seal rotary part (105). Then fit it along with the washer and spring. Start at the non-drive end.
2. Fit the O-ring (109, 109a).
3. Fit the seal housing (124).
4. Fit the seal housing screws (114). Tighten to the correct torque. See section 2.3.1 *Tightening torques*.
5. Press the stationary shaft seal part (105) home in the seal cover (58).
6. Fit the gasket (110a), or lubricate and fit the O-ring (110).
7. Fit and cross-tighten the screws (58a) to the correct torque. See section 2.3.1 *Tightening torques*.
8. Fit the slinger (79).
9. Press the lip seal (113f) home in the bearing housing (113).
10. Fit the bearing housing (113) and the screws (114b). Cross-tighten to the correct torque. See section 2.3.1 *Tightening torques*.
11. Fit the spacer ring (54c) (not pump type LS 350-250-498 and LS 350-250-630).
12. Lubricate the bearing (54), and press it home in the bearing housing (113). For lubricant, see section *Ball bearing grease*.
13. Fit the spacer ring (54c) (not pump type LS 350-250-498 and LS 350-250-630).
14. Fit the bearing snap ring (54d).
15. Fit the gasket (113e), bearing cover (113d) and screws (114a). Cross-tighten to the correct torque. See section 2.3.1 *Tightening torques*.
16. Make sure to polish off any burrs on the shaft drive end.
17. Repeat steps 1 to 10 for the drive end.
18. Lubricate the bearing (53), and press it home in the bearing housing (113). For lubricant, see section *Ball bearing grease*.
19. Fit the gasket (113e), bearing cover (113d) and screws (114a). Cross-tighten to the correct torque. See section 2.3.1 *Tightening torques*.
20. Check that the shaft can rotate freely.
21. Fit the key (11a).

4.5 Assembling the pump, without sleeve

4.5.1 LS without sleeve, construction type 1

Fitting the impeller

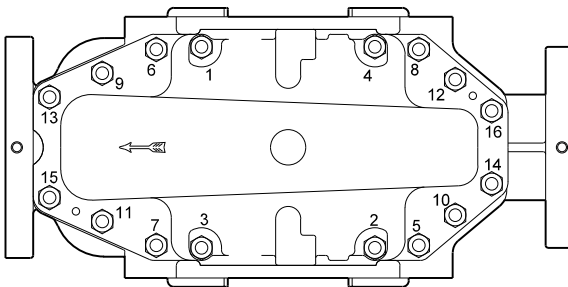
1. Fit the shaft (51) in the impeller (49).
2. Fit the impeller nut (67b) on the shaft, and tighten the nut.

Fitting the gaskets, impeller and shaft

1. Draw the outline of the old gasket (72a) on a new gasket material (gasket thickness 0.8 mm), make holes for the staybolts, and coarsely cut out the gasket.
2. Fit the guide screws in the lower pump housing (6b).
3. Fit the gasket (72a), and cut it out if it affects the volute.
4. Fit the wear rings (45b) on the impeller (49), and check that they can rotate freely.
5. Lift the shaft, impeller and wear rings home in the pump housing. Make sure that the pins at the bottom of the pump housing engage with the holes of the wear rings.

Fitting the upper pump housing

1. Clean the packing face of the upper pump housing (6a), and fit the pump housing.
2. Knock the guide pins down into the lower pump housing (6b).
3. Remove the guide screws in the lower pump housing (6b).
4. Fit the screws (26d), and tighten them, but leave loose, in the order shown in fig. 5 (only pump type LS 65-50-330).
5. Fit the screws (26c), and tighten them, but leave loose, in the order shown in fig. 5.



TM04 1865 1208

Fig. 5 Tightening order in principle for screws pos. 26c

6. Tighten the screws (26d) to the correct torque. See section 2.3.1 *Tightening torques*. The tightening order is shown in fig. 5 (only pump type LS 65-50-330).
7. Tighten the screws (26c) to the correct torque. See section 2.3.1 *Tightening torques*. The tightening order is shown in fig. 5.
8. Check that the shaft can rotate freely.
9. Remove excess gasket material.

Fitting the bearings and shaft seals

1. Clean the seal head surface using clean paper. Install the seal head on the shaft, rely onto the seal retainer ring (105b). Start at the non-drive end.
2. Press the rotary shaft seal part (105) home in the seal housing (124).
3. Fit the seal housing (124), gasket (113e) and slinger (79). Note that the slinger must be placed between the stationary shaft seal part and the bearing.
4. Fit the screws (114). Cross-tighten to the correct torque. See section 2.3.1 *Tightening torques*.
5. Make sure to polish off any burrs on the shaft drive end.
6. Repeat steps 1 to 4 for the drive end.
7. Check that the shaft can rotate freely.
8. Lubricate the bearing (54), and press it home in the seal housing (124). For lubricant, see section *Ball bearing grease*.

9. Install the bearing into the bearing (54) housing. Then install the washer and tighten the round nut.
10. Lock the nut by a lock washer.
11. Lubricate the bearing (54). For lubricant, see section *Ball bearing grease*.
12. Install the bearing (53) into the bearing housing.
13. Lubricate the bearing (53). For lubricant, see section *Ball bearing grease*.
14. Fit the gasket (113e), bearing cover (113c) and screws (114a). Cross-tighten to the correct torque. See section 2.3.1 *Tightening torques*.
15. Check that the shaft can rotate freely.
16. Fit the key (11a).

4.5.2 LS without sleeve, construction type 2

Fitting the impeller

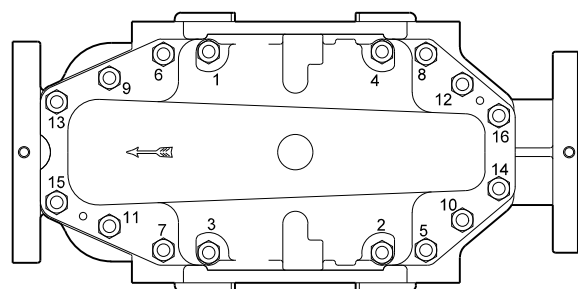
1. Fit the shaft (51) in the impeller (49).
2. Fit and tighten the impeller nut (67b).

Fitting the gaskets, impeller and shaft

1. Draw the outline of the old gasket (72a) on a new gasket material (gasket thickness 0.8 mm), make holes for the staybolts, and coarsely cut out the gasket.
2. Fit the guide screws in the lower pump housing (6b).
3. Fit the gasket (72a), and cut it out.
4. Fit the snap ring (65) (only pump type LS 200-150-483).
5. Fit the wear rings (45a, 45b or 45c) on the impeller (49), and check that they can rotate freely.
6. Lift the shaft, impeller and wear rings home in the pump housing. Make sure that the slits at the side of the pump housing engage with the pins (24) in the wear rings (45c) (not pump type LS 200-150-508 and LS 200-150-483).
7. Lift the shaft, impeller and wear rings home in the pump housing. Make sure that the pins at the bottom of the pump housing engage with the holes in the wear rings (only pump type LS 200-150-508 and LS 200-150-483).

Fitting the upper pump housing

1. Clean the packing face of the upper pump housing (6a), and fit the pump housing.
2. Knock the guide pins down into the lower pump housing (26b).
3. Remove the guide screws in the lower pump housing (6b).
4. Fit the screws (26c, 26d), and tighten them, but leave loose, in the order shown in fig. 6.



TM04 1865 1208

Fig. 6 Tightening order in principle for screws pos. 26c

5. Tighten the screws (26c, 26d) to the correct torque. See section 2.3.1 *Tightening torques*. The tightening order is shown in fig. 6.
6. Check that the shaft can rotate freely.
7. Remove excess gasket material.

Fitting the bearings and shaft seals

1. Clean the seal head surface using clean paper. Install the seal head on the shaft, rely onto the seal retainer ring (105b). Start at the non-drive end.
2. Fit the O-ring (109, 109a).
3. Fit the seal housing (124).
4. Fit the seal housing screws (114). Tighten to the correct torque. See section 2.3.1 *Tightening torques*.
5. Press the stationary shaft seal part (105) home in the seal cover (58).
6. Fit the gasket (110a) or O-ring (110).
7. Fit and cross-tighten the screws (58a) to the correct torque. See section 2.3.1 *Tightening torques*.
8. Fit the slinger (79).
9. Press the lip seal (113f) home in the bearing housing (113).
10. Fit the bearing housing (113) and the screws (114b). Cross-tighten to the correct torque. See section 2.3.1 *Tightening torques*.
11. Fit the spacer ring (54c) (not pump type LS 350-250-498 and LS 350-250-630).
12. Lubricate the bearing (54), and press it home in the bearing housing (113). For lubricant, see section *Ball bearing grease*.
13. Fit the spacer ring (54c) (not pump type LS 350-250-498 and LS 350-250-630).
14. Fit the gasket (113e), bearing cover (113d) and screws (114a). Cross-tighten to the correct torque. See section 2.3.1 *Tightening torques*.
15. Make sure to polish off any burrs on the shaft drive end.
16. Repeat steps 1 to 10 for the drive end.
17. Lubricate the bearing (53), and press it home in the bearing housing (113). For lubricant, see section *Ball bearing grease*.
18. Fit the gasket (113e), bearing cover (113d) and screws (114a). Cross-tighten to the correct torque. See section 2.3.1 *Tightening torques*.
19. Check that the shaft can rotate freely.
20. Fit the key (11a).

4.6 Replacing ring in the stuffing box, LS with sleeve

4.6.1 Dismantling

1. Remove the four screws (114a) holding the bearing cover (113d).
2. Remove the bearing cover (113d) and gasket (113e).
3. Loosen the set screw in the bearing snap ring (54).
4. Loosen the bearing snap ring (54) by moving it against the direction of rotation.
5. Remove any marks from the set screws on the shaft non-drive end (51).
6. Loosen the nuts on the stuffing box gland.
7. Remove the screws (114).
8. Pull the seal housing (124) off the shaft (51) using a puller, and then remove the gasket (109b) or O-ring (109, 109a).
9. Remove the slinger (79).
10. Pull the bearing (54) out of the seal housing (124).
11. Remove the nuts and the stuffing box gland.
12. If necessary, use a packing ring extractor to pull out one or more worn packing rings.
13. Remove the washer.
14. Remove the snap ring.

4.6.2 Assembly

1. Measure the length of the used packing ring, and cut off a new one of the same length.
2. Cut the ends of the packing ring off at an angle of 45 °.
3. Fit the stuffing box gland, and tighten the nuts, but leave loose.
4. Fit the packing rings. The joinings between the packing ring ends are displaced 180 °.
5. Fit the washer and snap ring.
6. Press a punch down the middle of the packing rings so that they are pushed all the way to the edge.
7. Fit the gasket (109b) or O-ring (109, 109a).
8. Fit the seal housing (124) and the slinger (79). Note that the slinger must be placed between the stationary shaft seal part and the bearing.
9. Fit the screws (114). Cross-tighten to the correct torque. See section 2.3.1 *Tightening torques*.
10. Check that the shaft can rotate freely.
11. Lubricate the bearing (54), and press it home in the seal housing (124). For lubricant, see section *Ball bearing grease*.
12. Fit the bearing snap ring (54) by moving it with the direction of rotation. Then tighten the two set screws.
13. Fit the gasket (113e), bearing cover (113d) and screws (114a). Cross-tighten to the correct torque. See section 2.3.1 *Tightening torques*.
14. Tighten the nuts of the stuffing box gland.

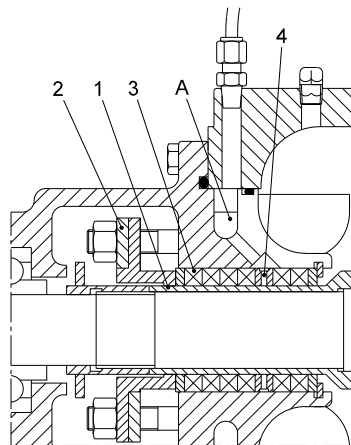


Fig. 7 Sectional drawing of the stuffing box

5. Alignment

5.1 Preliminary alignment

DANGER

Electric shock

Death or serious personal injury

- Before starting work on the pump, make sure that the power supply has been switched off and that it cannot be accidentally switched on.

The pump and motor are pre-aligned on the base frame from the factory. Some deformation of the base frame may occur during transport and it is therefore essential to check alignment at the installation site before final grouting.

Inaccurate alignment results in vibration and excessive wear on the bearings, shaft and wear rings.



Carry out alignment of the motor only, as pipe strain will occur if the pump is shifted.

Carry out alignment of the motor by placing shims of different thickness under the motor. If possible, replace several thin shims with one thick shim.

The preliminary alignment procedure has four steps:

1. Checking coupling clearance

Make sure that the gap between the coupling halves is equal to the values in the table and that the keyways are 180 ° displaced.

For a coupling with an outside diameter of Ø [mm]	Coupling clearance [mm]	
	Nominal	Tolerance
Ø90-213	3.2	0/-1
Ø251-270	4.8	0/-1
Ø306-757	6.4	0/-1

2. Checking soft foot on pump and motor

A pump or a motor having a soft foot can be compared to sitting down at a table and finding that the table rocks when someone leans on it. Technically, it is a condition where the feet of a motor or a pump are not at the same level as the base plate.

To check for soft foot, set the pump or motor on its base plate and bolt it down. Set a dial gauge on one foot, loosen the hold-down bolt, and watch the dial gauge. If the dial gauge indicator moves while loosening the bolt, the pump or motor has soft foot. The movement measured by the dial gauge indicates how many shims you need to level the pump or motor. Repeat this procedure at all four corners.

If the pump was installed a long time ago, the stresses induced in the pump housing by soft foot can cause permanent deformation of the housing.

3. Checking parallel alignment

Place a straight edge across both coupling rims at the top, the bottom and both sides. See fig. 8. After each adjustment, recheck all features of alignment. Parallel alignment is correct when the measurements show that all points of the coupling faces are within 0.2 mm of each other.

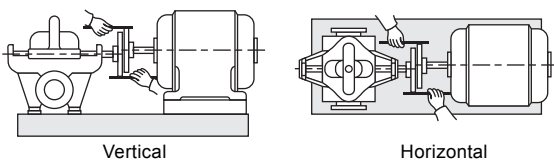


Fig. 8 Checking parallel alignment

TM03 0209 4504

4. Checking angular alignment

Insert a pair of inside callipers or a taper gauge at four points at 90 ° intervals around the coupling. See fig. 9. The angular alignment is correct when the measurements show that all points of the coupling faces are within 0.2 mm of each other.

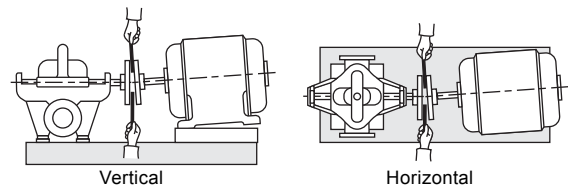


Fig. 9 Checking angular alignment

TM03 0213 4504

Recheck the coupling clearance and tighten the set screws on the couplings.

Tightening torques

Description	Dimensions	Tightening torque [Nm]
Hexagon head screw	M6	10
	M8	12
	M10	23
	M12	40
	M16	80
	M20	120
	M24	120

5.2 Final alignment



Make the final alignment by shimming the motor only.

1. Let the pump run until it has reached its operating temperature under normal operating conditions, approximately 1 hour.
2. Stop the pump.
3. Remove the coupling guard.
4. Check the alignment on the coupling by means of dial gauges. See below.

Checking coupling alignment by means of dial gauges

Alternatively, use laser equipment for the final alignment.

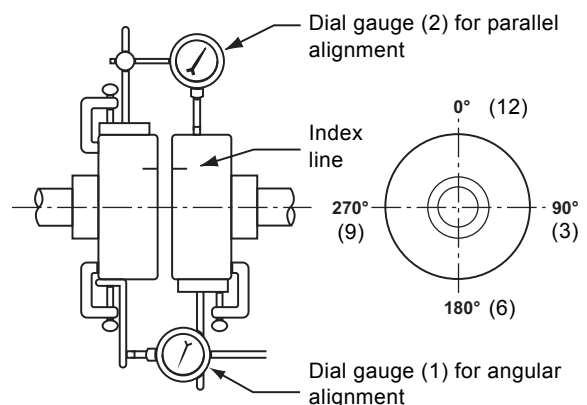
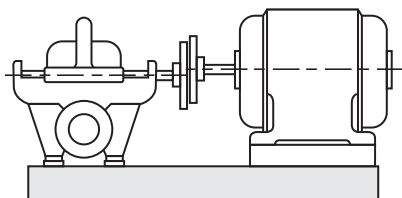


Fig. 10 Dial gauge arrangements; the end view of the coupling seen from the motor

TM03 0210 4504

The coupling alignment procedure has four steps:

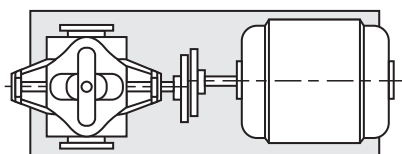
Parallel alignment - vertically



TM03 2939 4905

1. Mount the dial gauge (2) in position 0° (12 o'clock). See fig. 10.
2. Make the index lines on the two coupling halves. See fig. 10.
3. Set the dial gauge pointer to zero, turn the motor and pump shaft simultaneously until the dial gauge is in position 180° (6 o'clock) and check that the index lines are still in line.
4. Read the dial gauge (2). If the dial gauge shows a deflection exceeding 0.2 mm, add or remove the shims under the motor until the reading of the dial gauge is within the allowable tolerance of 0.2 mm.

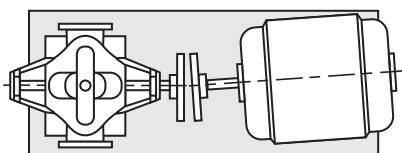
Parallel alignment - horizontally



TM03 2941 4905

1. Turn the motor and pump shaft to 270° (9 o'clock).
2. Set the dial gauge pointer to zero, turn the motor and pump shaft to 90° (3 o'clock) and check that the index lines are still in line.
3. Read the dial gauge. If the dial gauge shows a deflection exceeding 0.2 mm, move the motor sideways until the reading of the dial gauge is within the allowable tolerance of 0.2 mm.
4. Remove the dial gauge (2).

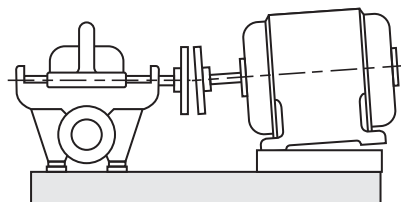
Angular alignment - horizontally



TM03 2942 4905

1. Mount the dial gauge (1) in position 90° (3 o'clock). See fig. 10.
2. Make the index lines on the two coupling halves. See fig. 10.
3. Set the dial gauge pointer to zero, turn the motor and pump shaft simultaneously until the dial gauge is in position 270° (9 o'clock) and check that the index lines are still in line.
4. Read the dial gauge (1). If the dial gauge shows a deflection exceeding 0.2 mm, move the motor sideways until the deflection is halved.
5. Set the dial gauge pointer to zero, turn the motor and pump shaft simultaneously until the dial gauge is in position 90° (3 o'clock) and read the dial gauge (1) again.
6. Now the reading must be within the allowable tolerance of 0.2 mm. If not, repeat the procedure.

Angular alignment - vertically



TM03 2940 4905

1. Turn the motor and pump shaft until the dial gauge (1) is in position 0° (12 o'clock).
2. Set the dial gauge pointer to zero, turn the motor and pump shaft simultaneously until the dial gauge is in position 180° (6 o'clock) and check that the index lines are still in line.
3. Read the dial gauge (1). If the dial gauge shows a deflection exceeding 0.2 mm, add or remove the shims under the motor until the deflection is halved.
4. Set the dial gauge pointer to zero, turn the motor and pump shaft simultaneously until the dial gauge is in position 0° (12 o'clock) and read the dial gauge (1) again.
5. Now the reading must be within the allowable tolerance of 0.2 mm. If not, repeat the procedure.
6. Remove the dial gauge (1).



The coupling tolerances may differ from coupling make to coupling make. For the standard coupling, the allowable tolerance is 0.2 mm. For other coupling types, see the coupling data supplied with the pump.

Finish the alignment procedure by refitting and tightening the coupling.

WARNING

Personal injury

- Death or serious personal injury
- To protect persons from rotating machine parts, always install all guards after installation is complete and before starting the pump.



6. Taking the product out of operation

The following shutdown procedures apply to most normal shutdowns. If the pump is to be inoperative for a long time, follow the storage procedures in section 6.2 *Long-term shutdown*.

1. Always close the outlet valve or throttle valve before stopping the pump. Close the valve slowly to prevent hydraulic shock, but make sure that the pump does not run against a closed valve for more than a few seconds.
2. Switch off the power supply to the motor.

6.1 Short-term shutdown

1. For overnight or temporary shutdown periods under non-freezing conditions, the pump may remain filled with liquid. Make sure the pump is fully primed before restarting.
2. For short or frequent shutdown periods at temperatures below 0°C, keep the liquid moving within the pump housing and insulate or heat the pump exterior to prevent freezing.

6.2 Long-term shutdown

For long shutdown periods or to isolate the pump for maintenance, close the inlet and outlet valves. If no inlet valve is fitted and the pump has positive inlet height, drain all liquid from the inlet pipe to terminate the liquid flow into the pump inlet port. If applicable, turn off any external source of cooling or lubricating liquid to the stuffing boxes or shaft seals. Remove the plugs in the pump drain and vent tapplings, as required, and drain all liquid from the pump housing. Remove the stuffing box glands and packing rings, if applicable.

CAUTION

Hot or cold surface



- Minor or moderate personal injury
- Make sure that the escaping water does not cause injury to persons or damage to the motor or other components.
- In hot-water installations, pay special attention to the risk of injury caused by scalding hot water.
- In cold-liquid installations, pay special attention to the risk of injury caused by cold liquids and cold surfaces.

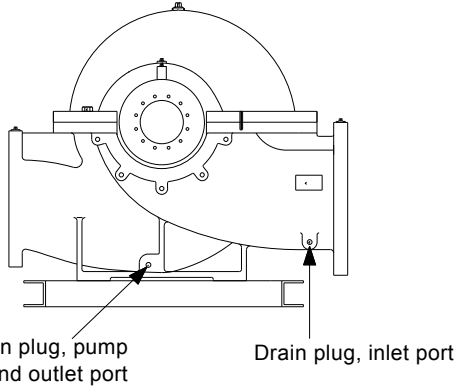


Fig. 11 Example of drain plugs

1. After draining the pump during long shutdown periods under freezing conditions, blow out all liquid in passages and air pockets using compressed air. You can prevent freezing of pumped liquid by filling the pump with antifreeze solution.

WARNING

Harm to health



- Death or serious personal injury
- Do not use antifreeze solution if you use the pump for public or potable-water supply.

2. Rotate the shaft by hand monthly to coat the bearings with lubricant and delay oxidation and corrosion.
3. Where applicable, follow the motor manufacturer's storage recommendations.



Do not tighten the vent screw or refit the drain plug until the pump is to be used again.

7. Identification

7.1 Nameplate

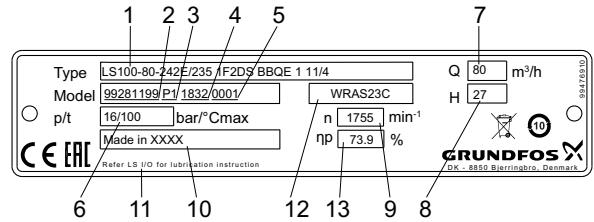


Fig. 12 Nameplate of LS pump

Pos.	Description
1	Type designation
2	Product number
3	Place of production
4	Production year and week
5	Serial number
6	Maximum pressure and temperature
7	Rated flow rate (duty-point flow rate)
8	Head at rated flow rate (duty-point head)
9	Speed
10	Country of production
11	Reference to LS installation and operating instructions for bearing lubrication
12	Liquid temperature rating, only for WRAS-approved pumps
13	Hydraulic pump efficiency at optimum efficiency point

TM04 0378 0608

TM07 2166 1319

7.2 Type key

Code	Example	LS	125	-100	-305X	/273.1	, (W)	1	F2	D	S	BBQE	1
Type range LS horizontal version													
Nominal diameter of the inlet port (DN)													
Nominal diameter of the outlet port (DN)													
Maximum impeller diameter [mm] If suffix is used: "X" = different impeller or construction design for single-stage pump, such as A, B, C...Z. "x2" = double-stage impeller design.													
Actual impeller diameter [mm]													
Potable-water code (optional) ACS- or WRAS-certified pump													

Code pump variant

- 1: Basic version, grease-lubrication, pump with motor, common base frame, standard coupling
- 2: Grease-lubrication, bare shaft pump with common base frame, standard coupling
- 3: Grease-lubrication, bare shaft pump
- 4: Grease-lubrication, pump with motor, separate base frames, spacer coupling
- 5: Grease-lubrication, bare shaft pump with separate base frame, spacer coupling
- 6: Oil-lubrication, pump with motor, common base frame, standard coupling
- 7: Oil-lubrication, bare shaft pump with common base frame, standard coupling
- 8: Oil-lubrication, bare shaft pump
- 9: Oil-lubrication, pump with motor, separate base frames, spacer coupling
- 0: Oil-lubrication, bare shaft pump with separate base frame, spacer coupling
- X: Special variant

Code for pipe connection

F1: 10 bar, DIN PN 10	G1: 175 PSI (12 bar), ANSI 125LB/150LB
F2: 16 bar, DIN PN 16	G2: 250 PSI (17.2 bar), ANSI 250LB/300LB
F3: 25 bar, DIN PN 25	G3: 400 PSI (27.6 bar), ANSI 250LB/300LB
XX: Special flanges	

Code for shaft and sleeve materials

D: SS420 and no sleeve	A: SS420 and SS304
E: SS304 and no sleeve	C: SS420 and SS316
J: SS316 and no sleeve	B: SS420 and bronze
L: Duplex stainless steel and no sleeve	K: Duplex stainless steel and duplex stainless steel
X: Special	

Code for pump housing and impeller materials

S: Cast iron and SS304	Q: Ductile iron and SS304
C: Cast iron and SS316	G: Ductile iron and SS316
B: Cast iron and bronze	A: Ductile iron and bronze
D: Cast iron and duplex stainless steel	H: Ductile iron and duplex stainless steel
U: SS304 and SS304	J: SS316 and SS316
K: Duplex stainless steel and duplex stainless steel	
X: Special	

Code for shaft seal or stuffing box

- BAQE: Rubber bellows seal, unbalanced, carbon*/SiC, EPDM
- BAQV: Rubber bellows seal, unbalanced, carbon*/SiC, FKM
- AAQE: O-ring seal, unbalanced, carbon*/SiC, EPDM
- AAQV: O-ring seal, unbalanced, carbon*/SiC, FKM
- DAQE: O-ring seal, balanced, carbon*/SiC, EPDM
- DAQV: O-ring seal, balanced, carbon*/SiC, FKM
- SAQE: Rubber bellows seal, balanced, carbon*/SiC, EPDM
- SAQV: Rubber bellows seal, balanced, carbon*/SiC, FKM
- BBQE: Rubber bellows seal, unbalanced, carbon/SiC, EPDM
- BBQV: Rubber bellows seal, unbalanced, carbon/SiC, FKM
- ABQE: O-ring seal, unbalanced, carbon/SiC, EPDM

Code Example

LS 125 -100 -305X /273.1 ,(W) 1 F2 D S BBQE 1

ABQV: O-ring seal, unbalanced, carbon/SiC, FKM
 DBQE: O-ring seal, balanced, carbon/SiC, EPDM
 DBQV: O-ring seal, balanced, carbon/SiC, FKM
 SBQE: Rubber bellows seal, balanced, carbon/SiC, EPDM
 SBQV: Rubber bellows seal, balanced, carbon/SiC, FKM
 BQQE: Rubber bellows seal, unbalanced, SiC/SiC, EPDM
 BQQV: Rubber bellows seal, unbalanced, SiC/SiC, FKM
 AQQE: O-ring seal, unbalanced, SiC/SiC, EPDM
 AQQV: O-ring seal, unbalanced, SiC/SiC, FKM
 DQQE: O-ring seal, balanced, SiC/SiC, EPDM
 DQQV: O-ring seal, balanced, SiC/SiC, FKM
 SQQE: Rubber bellows seal, balanced, SiC/SiC, EPDM
 SQQV: Rubber bellows seal, balanced, SiC/SiC, FKM
 BBVP: Rubber bellows seal, carbon/aluminium oxide, nitrile rubber
 SNEK: Stuffing box with synthetic polymer packing rings, uncooled, with internal barrier fluid

Direction of rotation

(Pump direction of rotation as seen from the motor end)

- 1: Clockwise
 2: Counterclockwise

* Antimony, not approved for potable water.

The example shown is an LS 125-100-305F/273.1 standard type with standard coupling, DIN PN 16 flange, cast iron pump housing with SS304 impeller, BBQE mechanical shaft seal and clockwise direction of rotation.

7.2.1 Codes for mechanical shaft seal

Positions (1) - (4) cover four pieces of information about the mechanical shaft seal:

Example	(1)	(2)	(3)	(4)
Grundfos type designation				
Material, rotating seal face				
Material, stationary seat				
Material, secondary seal and other rubber and composite parts				

The following table explains the positions (1), (2), (3) and (4).

Pos.	Type	Short description of seal
(1)	A	O-ring seal, unbalanced
	B	Rubber bellows seal, unbalanced
	D	O-ring seal, balanced
	S	Rubber bellows seal, balanced
	H	Cartridge seal, balanced
Pos.	Type	Material
(2) and (3)	A	Carbon, metal-impregnated (antimony, not approved for potable water)
	B	Carbon, resin-impregnated (approved for potable water)
	Q	Silicon carbide
	U	Tungsten carbide
	V	Aluminium oxide
Pos.	Type	Material
(4)	E	EPDM
	P	Nitrile rubber (NBR)
	V	FKM (Viton®)

For other mechanical shaft seal variants, please contact Grundfos.

7.2.2 Codes for stuffing box

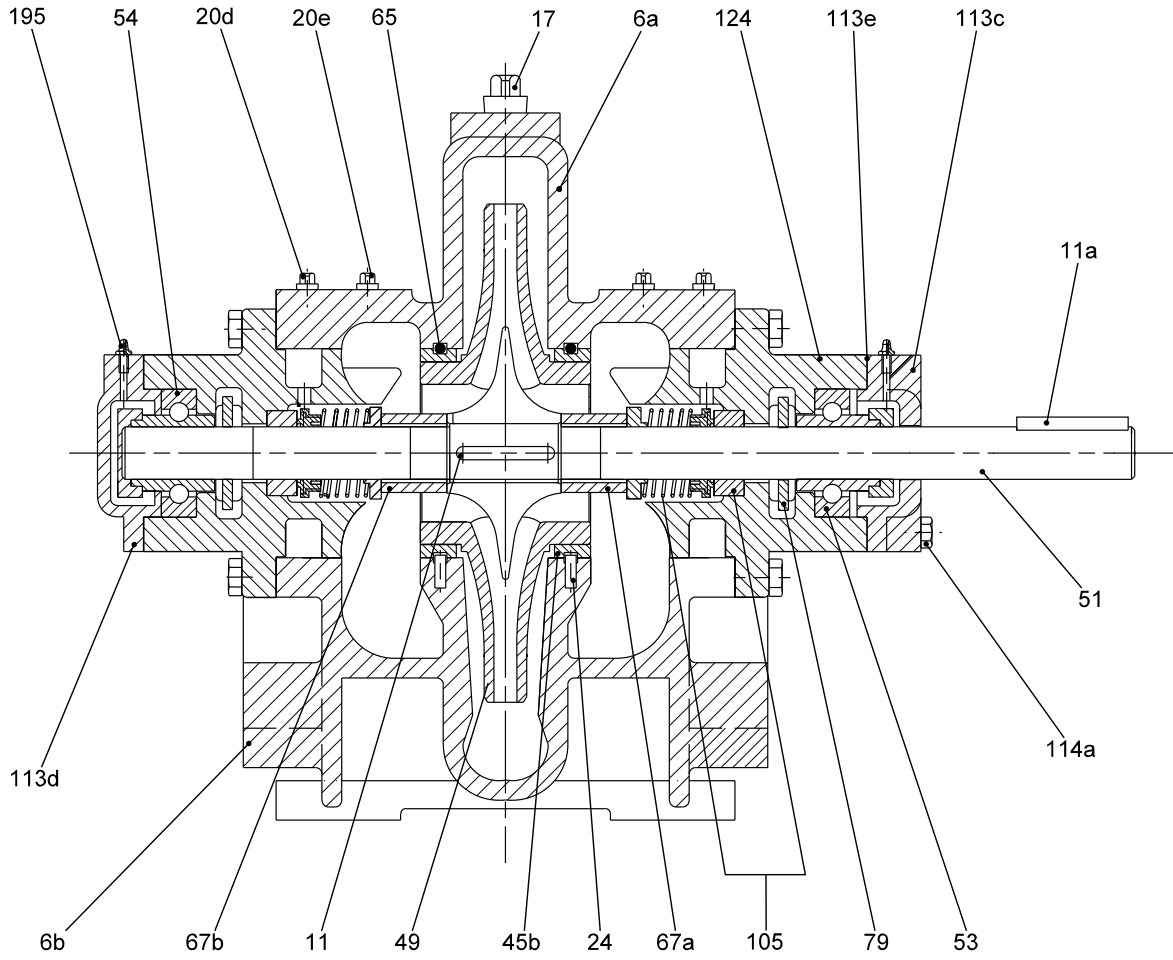
Pos.	Code	Short description of stuffing box
1	S	Stuffing box with packing rings
2	Cooling method	
	N	Uncooled stuffing box
3	Barrier fluid	
	E	With internal barrier fluid
4	K	Synthetic polymer packing rings, graphite impregnated. NBR O-ring in the pump

8. Standard components and material specifications

Pos.	Description	Material	Material standard
6a	Pump housing, upper	Cast iron	ASTM A48 Class35
		Ductile iron	ASTM A536, 65-45-12
6b	Pump housing, lower	Cast iron	ASTM A48 Class35
		Ductile iron	ASTM A536, 65-45-12
11	Key, impeller	Steel	ASTM A216 WCB
11a	Key, coupling	Steel	ASTM A216 WCB
17	Vent screw	Bronze	
20	Drain plug	Steel	
20a	Plug, drain outlet	Steel	
20b	Plug, inlet	Steel	
20c	Plug, outlet	Steel	
20d	Plug, shaft seal flushing	Steel	
20e	Plug, inlet chamber	Steel	
24	Locking pin, wear ring	Steel	ANSI/ASME B18.8
26b	Roll pin	Steel	ANSI/ASME B18.8
26c	Screw for pump housing	Steel	
32	Flushing pipe	Stainless steel	AISI 304
45	Wear ring	Bronze	ASTM B584, C90500
47c	Retainer for packing	Steel	ASTM A216 WCB
47d	Snap ring for packing	Carbon steel	
49	Impeller	Stainless steel	ASTM CF8
51	Shaft	Stainless steel	AISI 420
53	Bearing, drive end	Steel	
54	Bearing, non-drive end	Steel/bronze	
54c	Lock washer	Steel	
54d	Circlip	Steel	ASTM A216 WCB
54e	Round nut for bearing	Steel	ASTM A216 WCB
58	Seal cover	Cast iron	ASTM A48 Class35
58a	Screw	Steel	
65	Snap ring	Stainless steel	
66	O-ring for sleeve	NBR	
67b	Round nut for impeller	Stainless steel	
72a	Gasket	Vegetable fibre	
76	Nameplate	Stainless steel	AISI 304
79	Slinger	Neoprene	
105	Shaft seal	BBQV/GBQV	SiC/Carbon
105c	Seal retaining ring	Stainless steel	AISI 304
106	Packing gland	Cast iron	ASTM A48 Class35
107	Packing ring	PTFE	PTFE
108	Distribution ring	Steel	ASTM A216 WCB
109	O-ring	NBR	
109a	O-ring	NBR	
110	O-ring	NBR	
113	Bearing housing	Cast iron	ASTM A48 Class35
113c	Bearing cover, drive end	Cast iron	ASTM A48 Class35
113d	Bearing cover, non-drive end	Cast iron	ASTM A48 Class35
113e	Gasket	Vegetable fibre	
113f	Lip seal, non-drive end	NBR	
113g	Lip seal, drive end	NBR	
114	Screw for seal housing	Steel	
114a	Screw for bearing cover	Steel	
114b	Screw for bearing housing	Steel	
116	Shaft sleeve	Stainless steel	AISI 304
116a	Locking sleeve, drive end	Stainless steel	AISI 304
116b	Locking sleeve, non-drive end	Stainless steel	AISI 304
116c	Shaft sleeve, inner	Stainless steel	AISI 304
116e	Screw for shaft sleeve	Steel	
123	Shoulder ring	Steel	
124	Seal housing	Cast iron	ASTM A48 Class35
		Ductile iron	ASTM A536, 65-45-12
195	Lubricating nipple	Bronze	

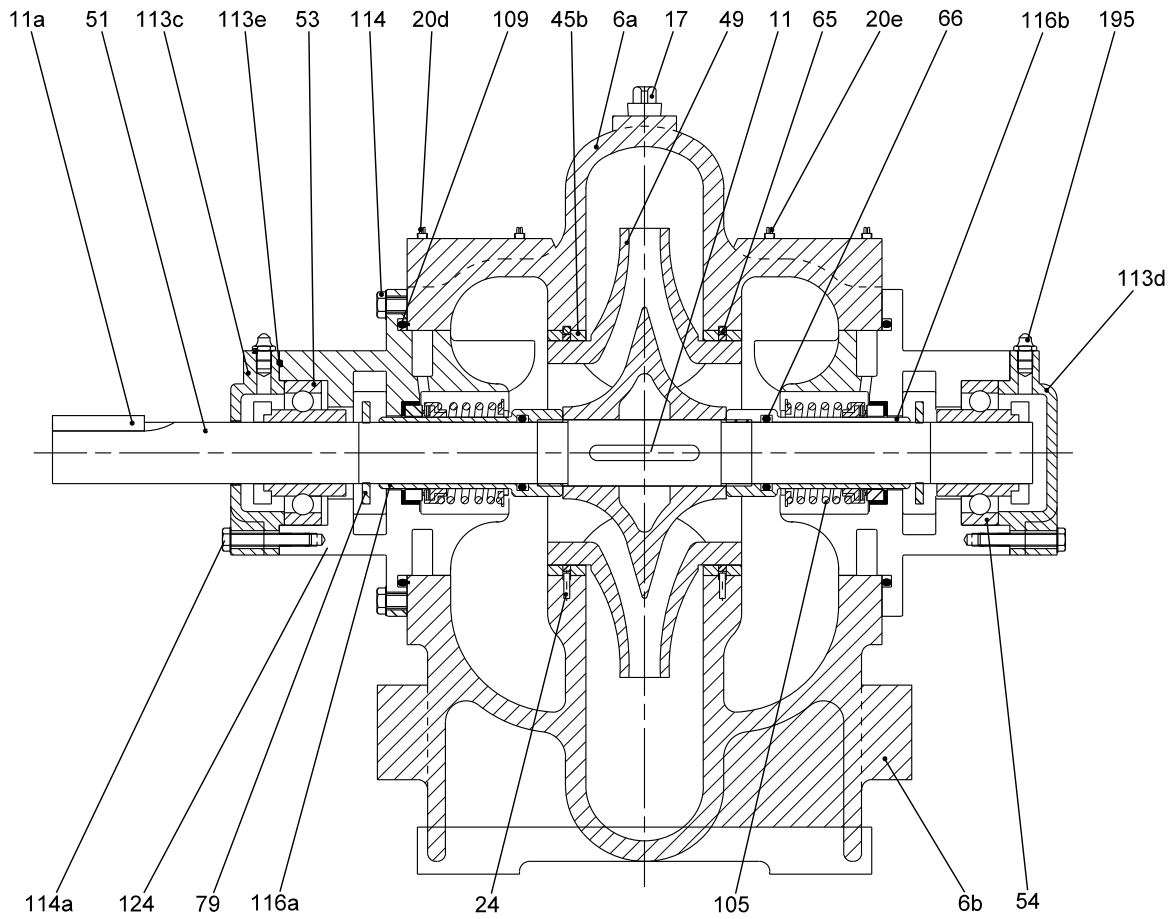
9. Sectional drawings

9.1 LS with sleeve, construction type 1



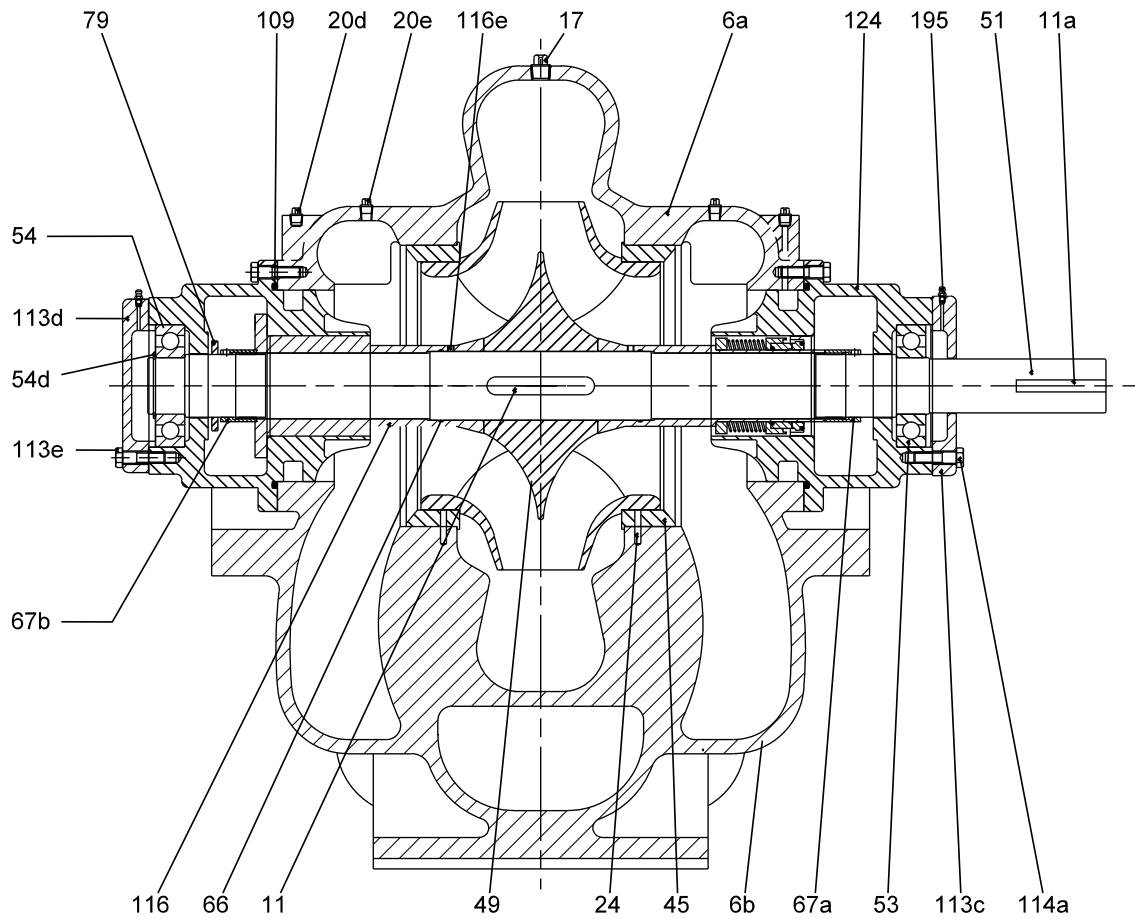
TM03 9952 4707

9.2 LS with sleeve, construction type 2



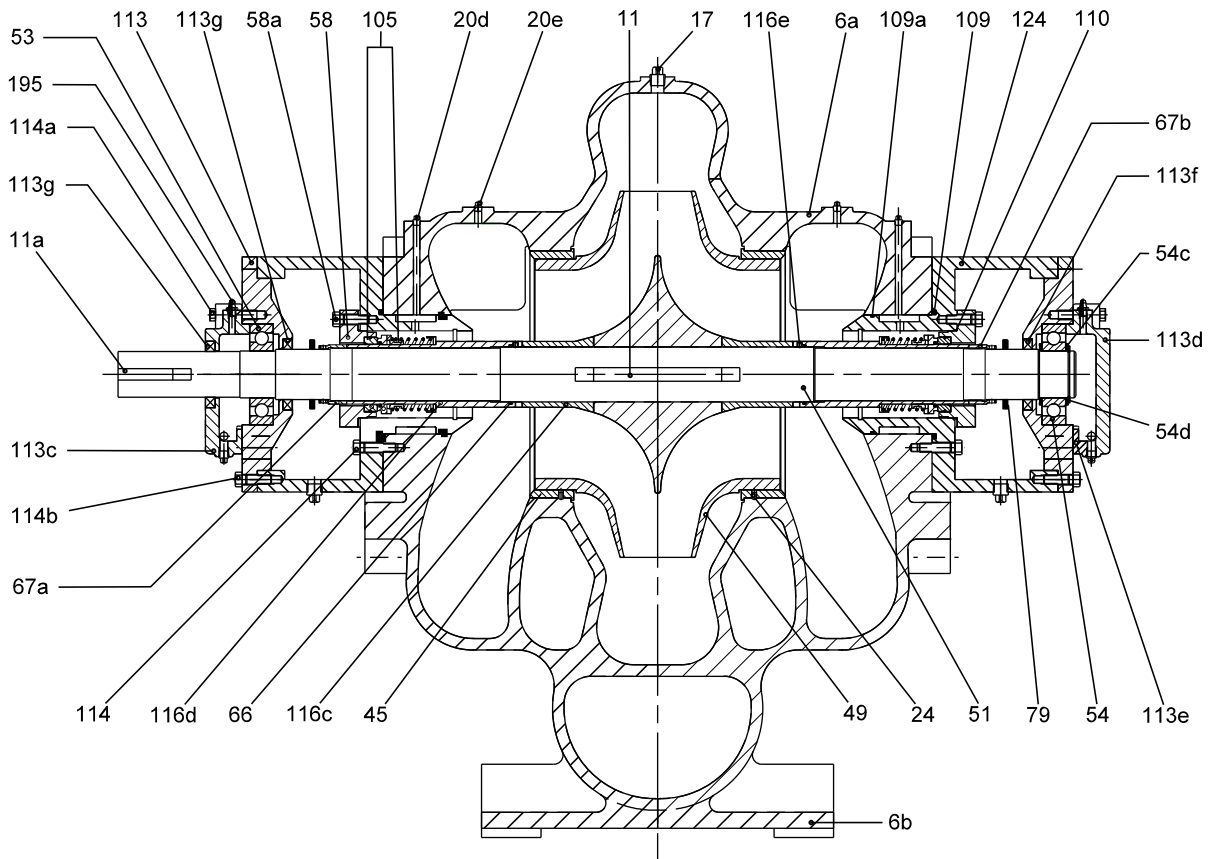
TM03 9953 4707

9.3 LS with sleeve, construction type 3



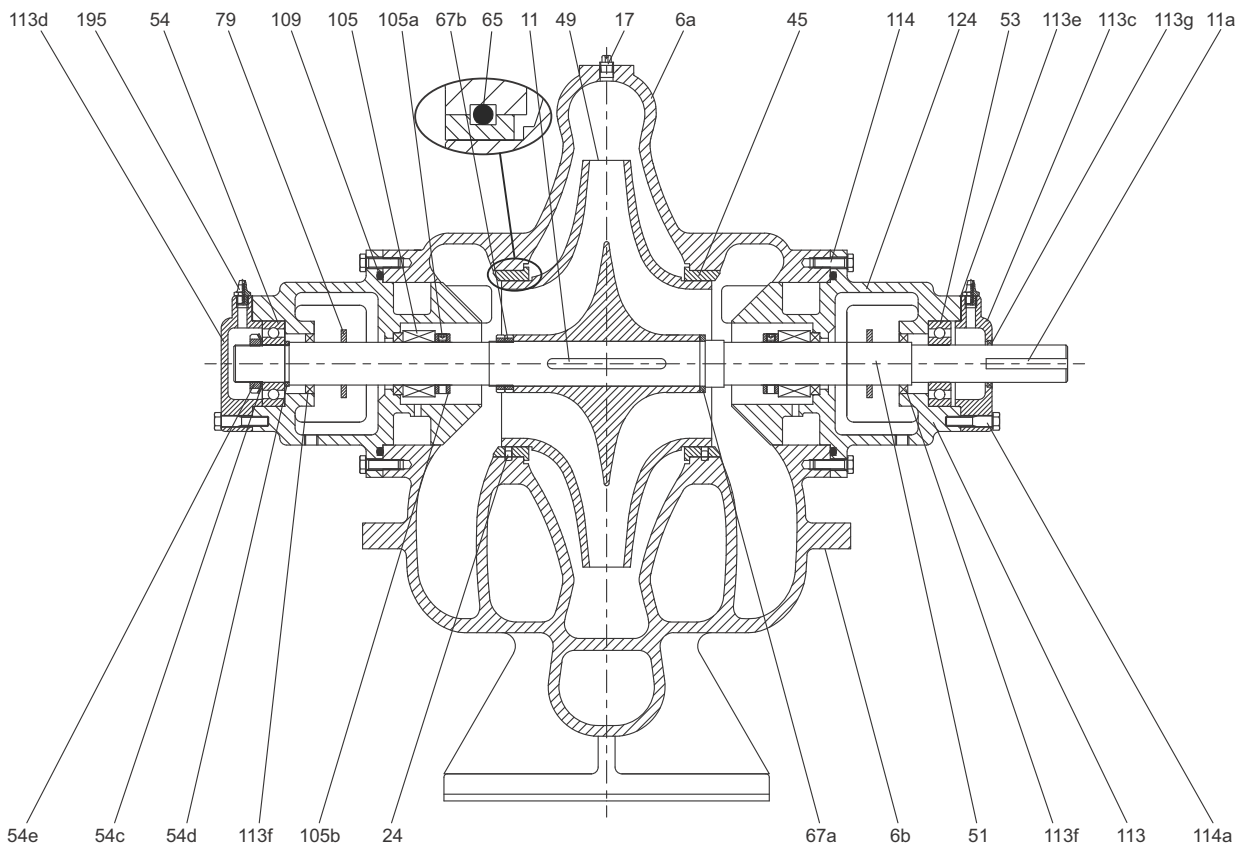
TM03 9954 4707

9.4 LS with sleeve, construction type 4



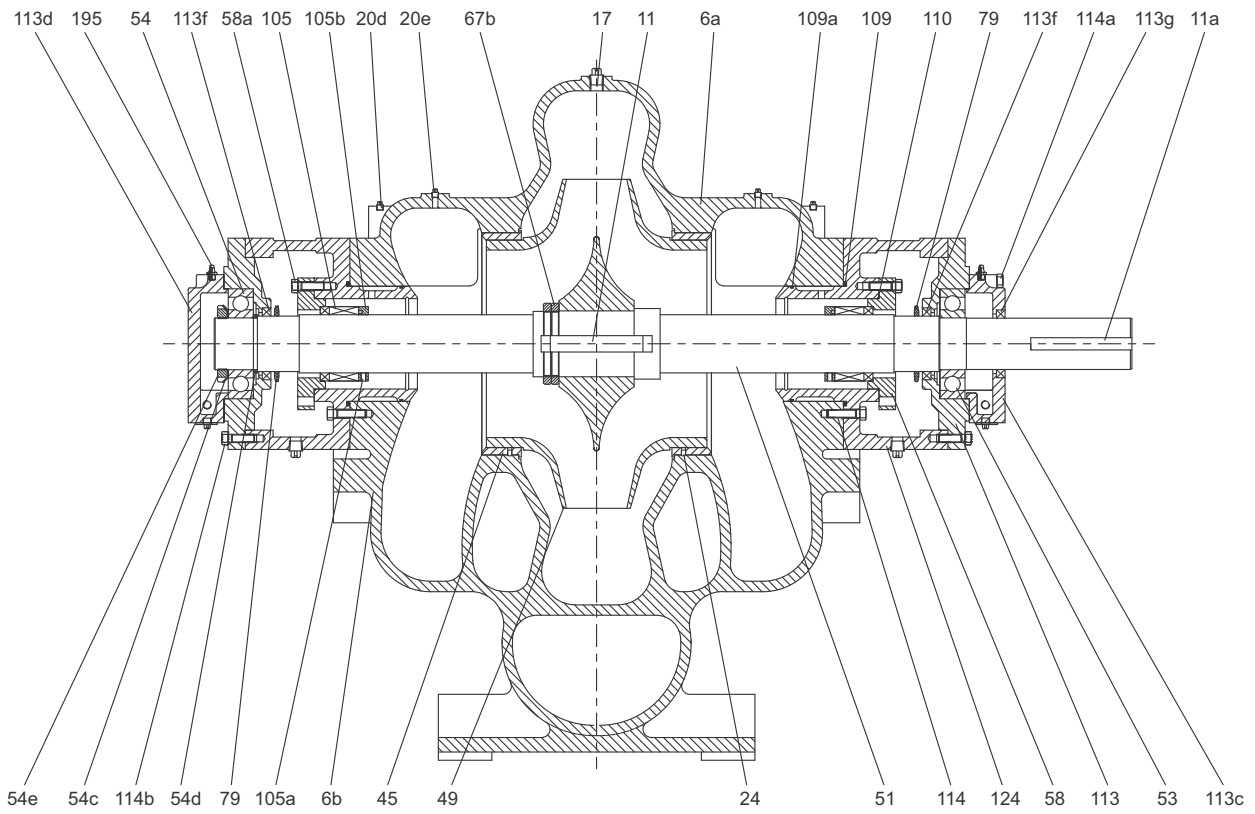
TN03 9955 4707

9.5 LS without sleeve, construction type 1



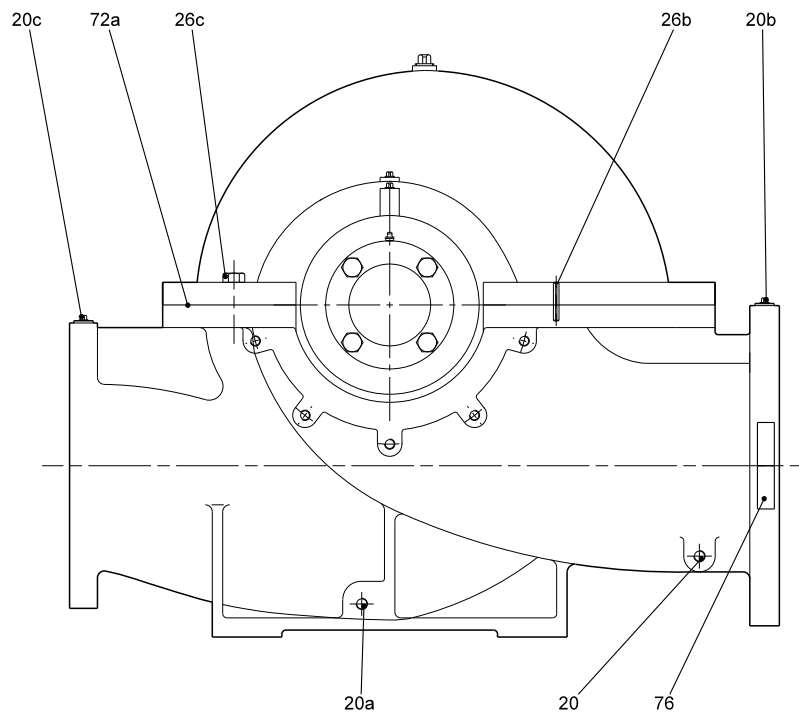
TN06 9244 2017

9.6 LS without sleeve, construction type 2



TM06 9245 2017

9.7 LS, typical end view, non-drive end



TM04 1864 1108

10. Exploded views

10.1 Coupling

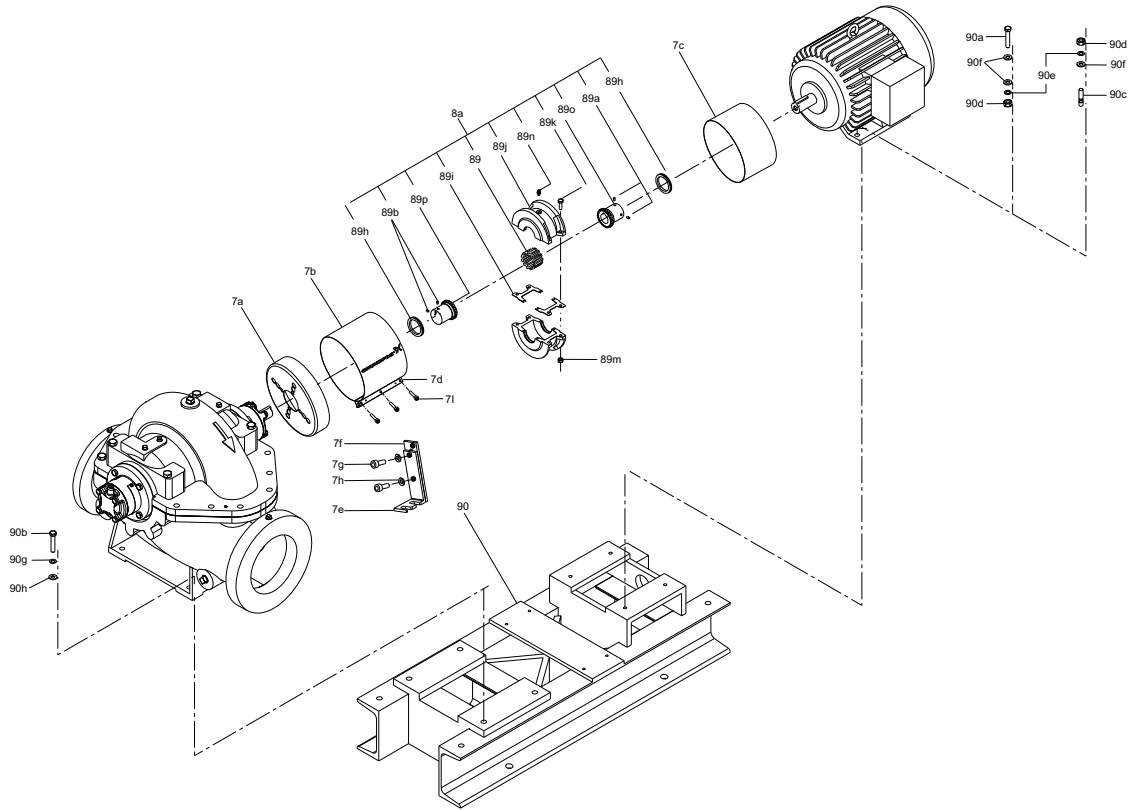


Fig. 13 Joining with coupling

TM04 0574 3317

10.2 LS with sleeve

10.2.1 Construction type 1

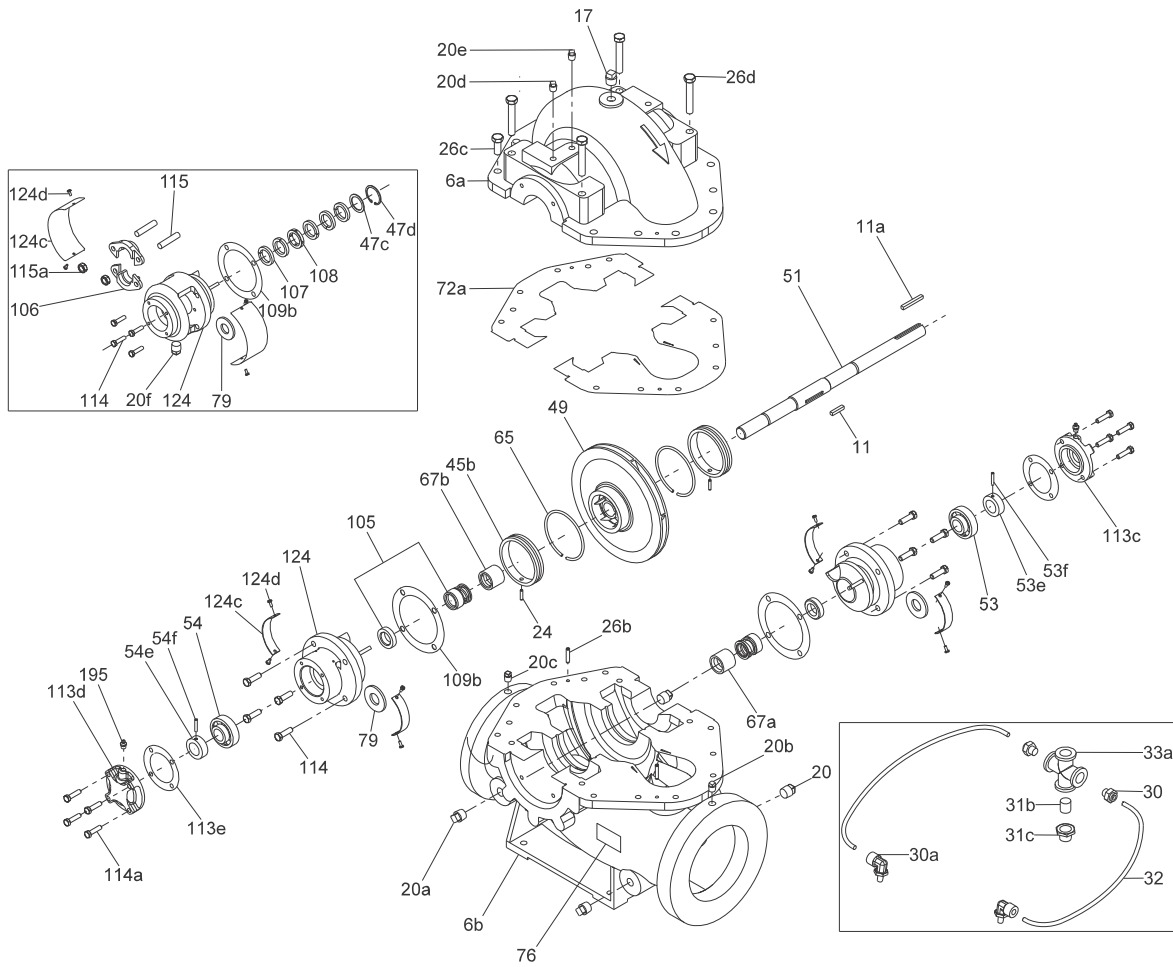


Fig. 14 Construction type 1: LS 65-50-241, LS 65-50-330, LS 100-80-241 X2

TM03 9940 4317

10.2.2 Construction type 2

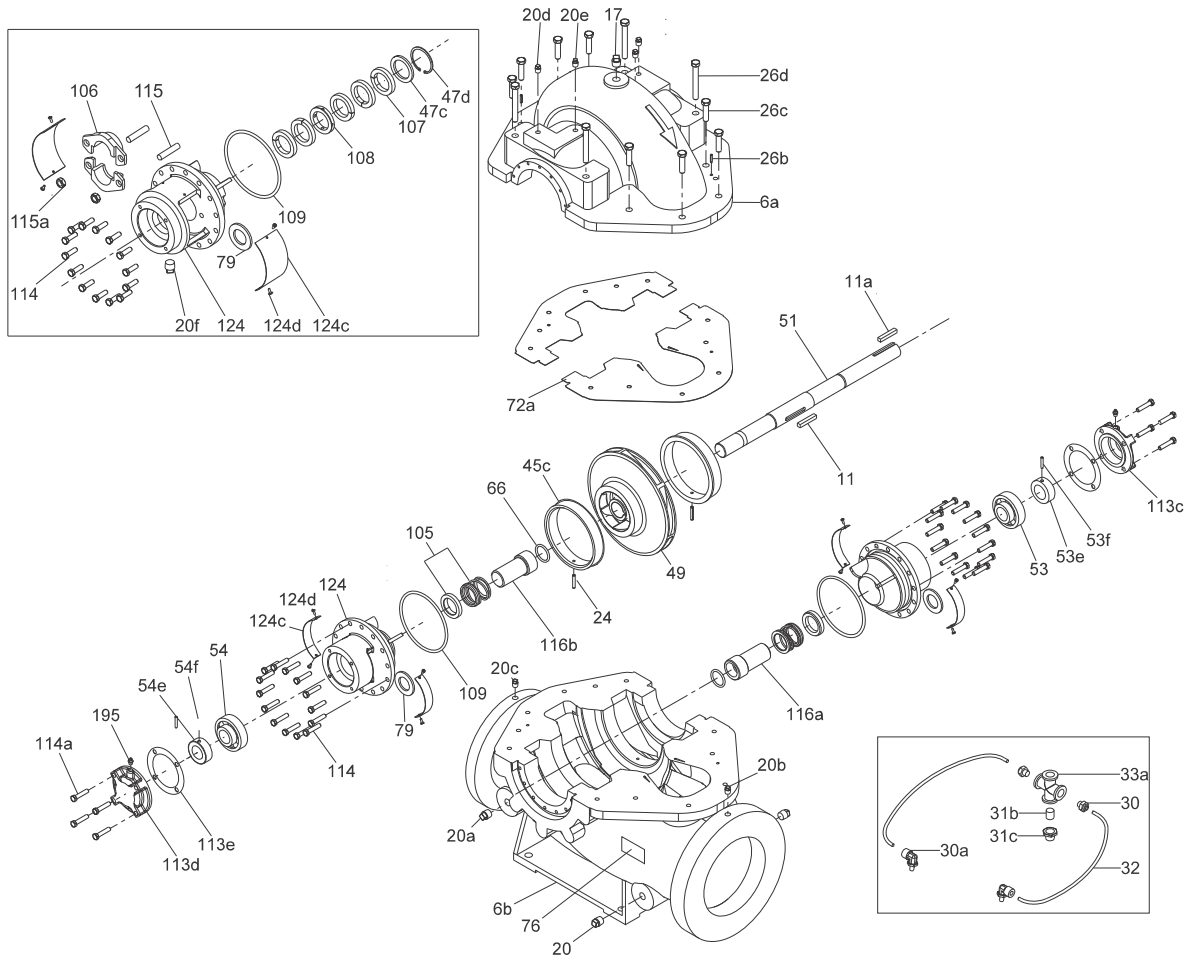


Fig. 15 Construction type 2: LS 150-125-305, LS 150-125-381, LS 200-150-305C

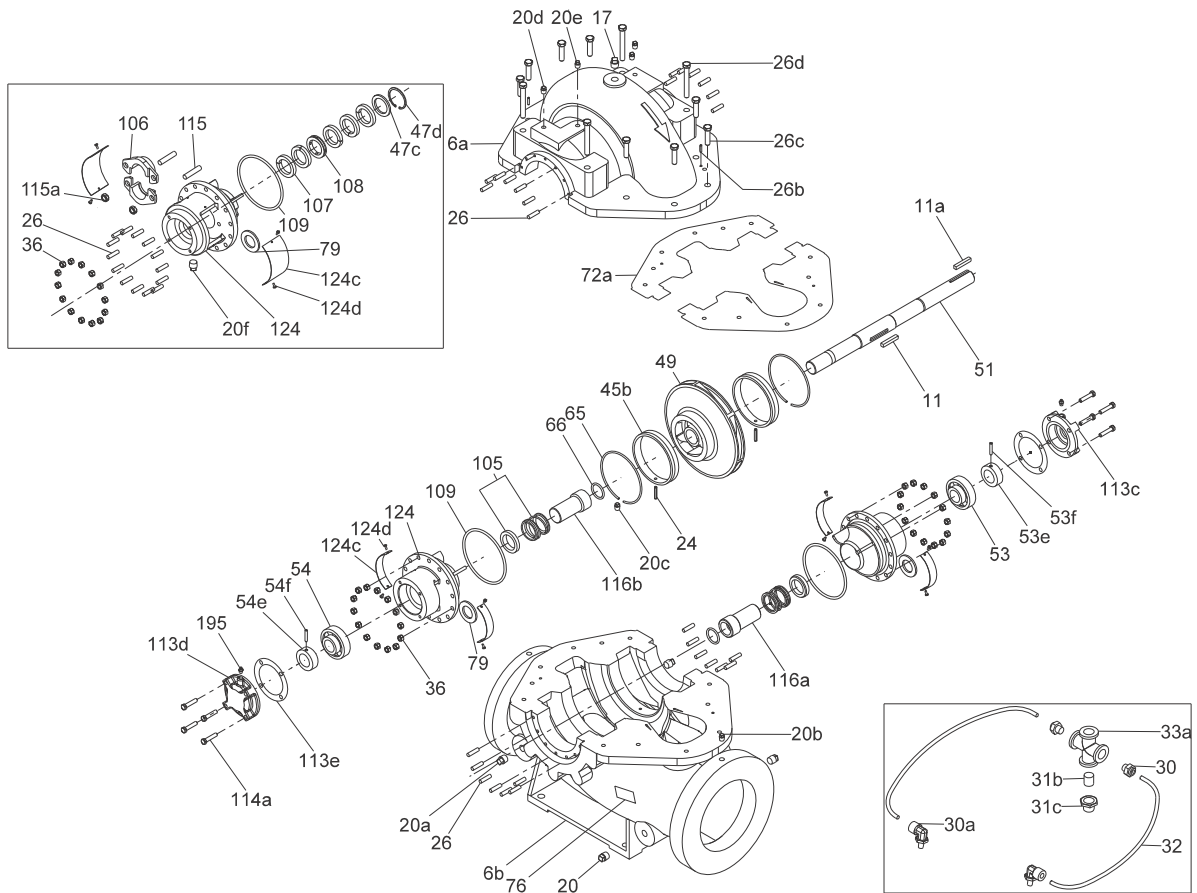


Fig. 16 Construction type 2: LS 125-100-279, LS 125-100-381, LS 125-100-305, LS 100-80-356, LS 200-150-305A

TM03 9950 4317

TM03 9943 4317

10.2.3 Construction type 3

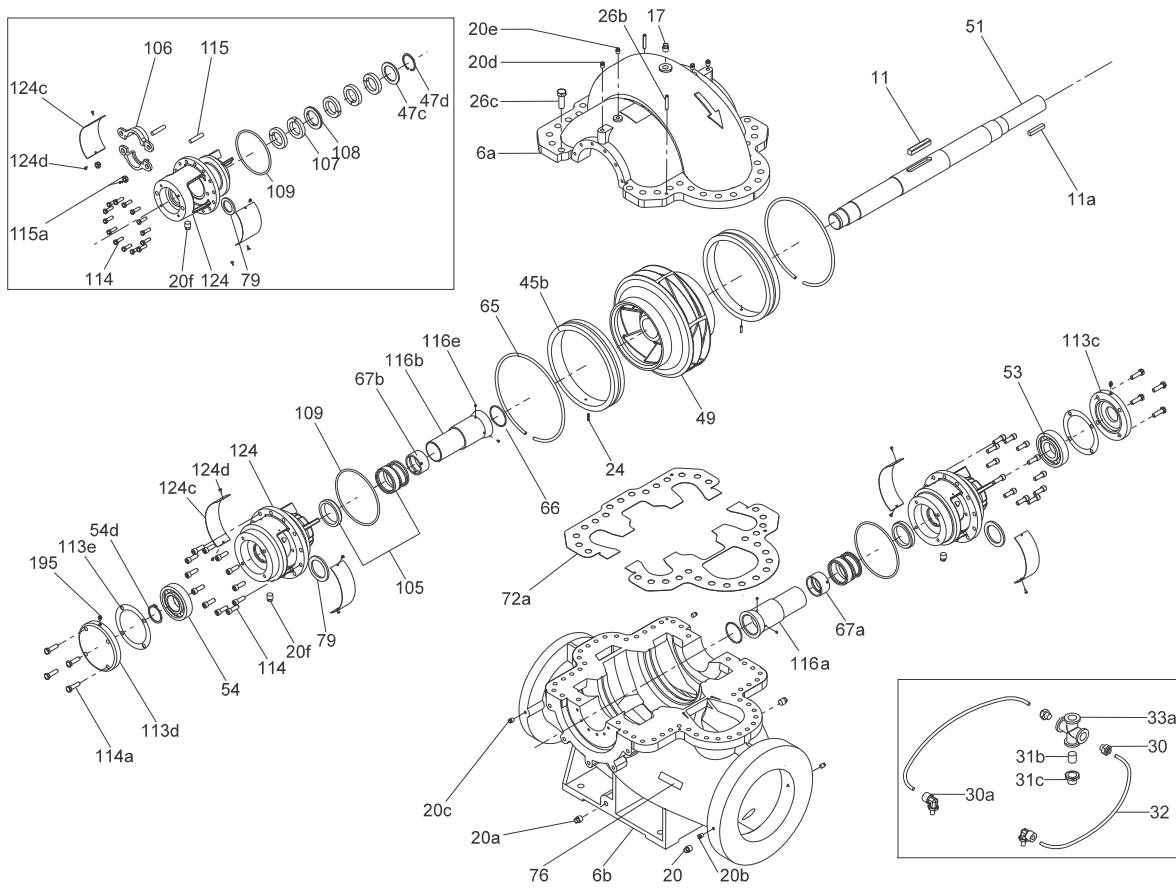


Fig. 17 Construction type 3: LS 200-150-483 X5

TM03 9947 4317

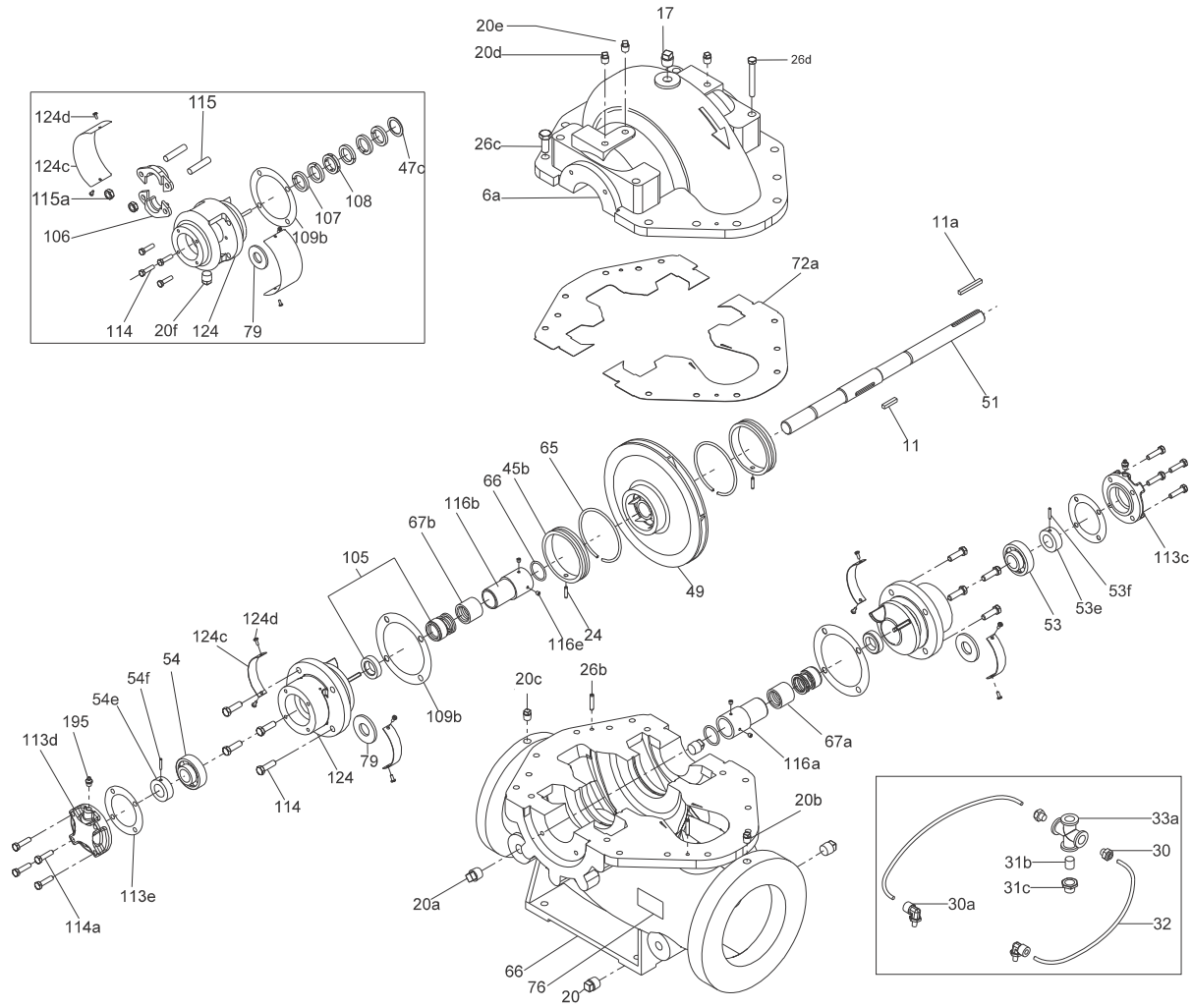


Fig. 18 Construction type 3: LS 100-80-241 XE

TM03 9951 4317

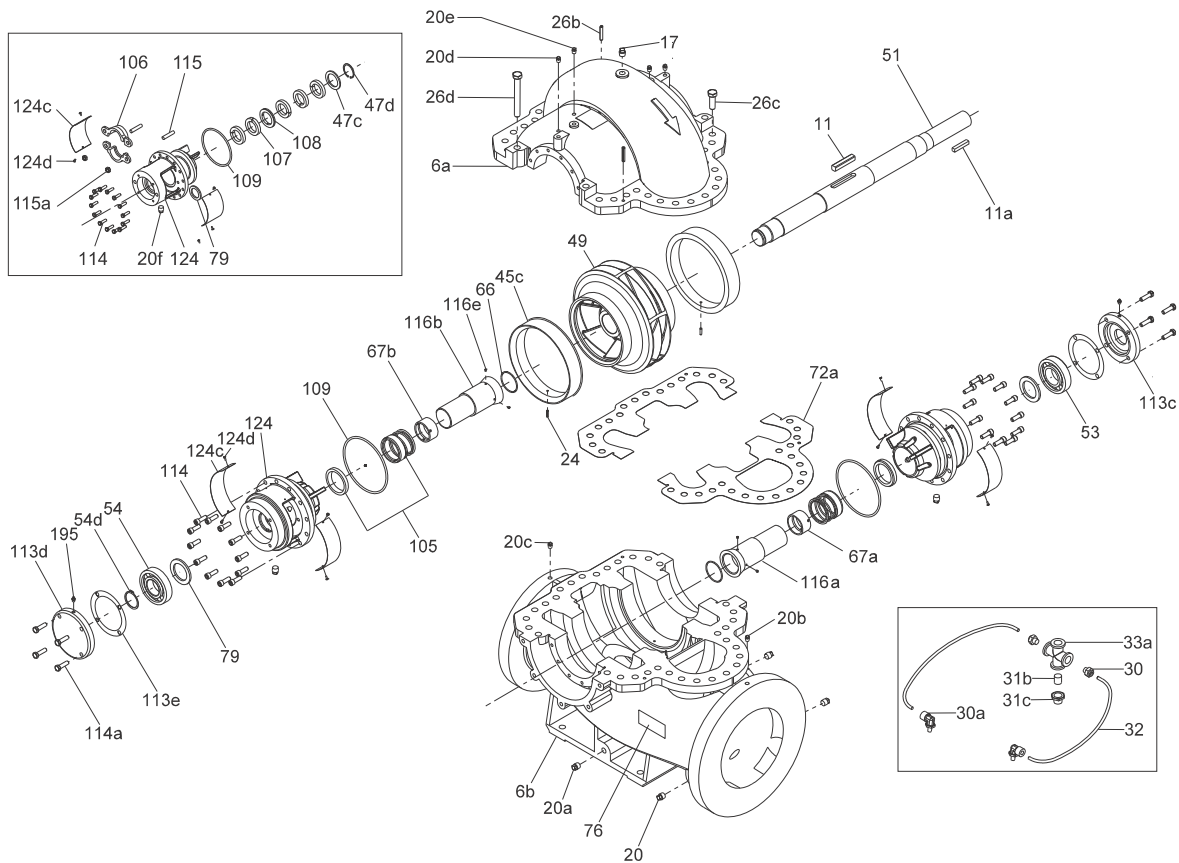


Fig. 19 Construction type 3: LS 200-150-381, LS 250-200-305, LS 250-200-381, LS 300-250-305

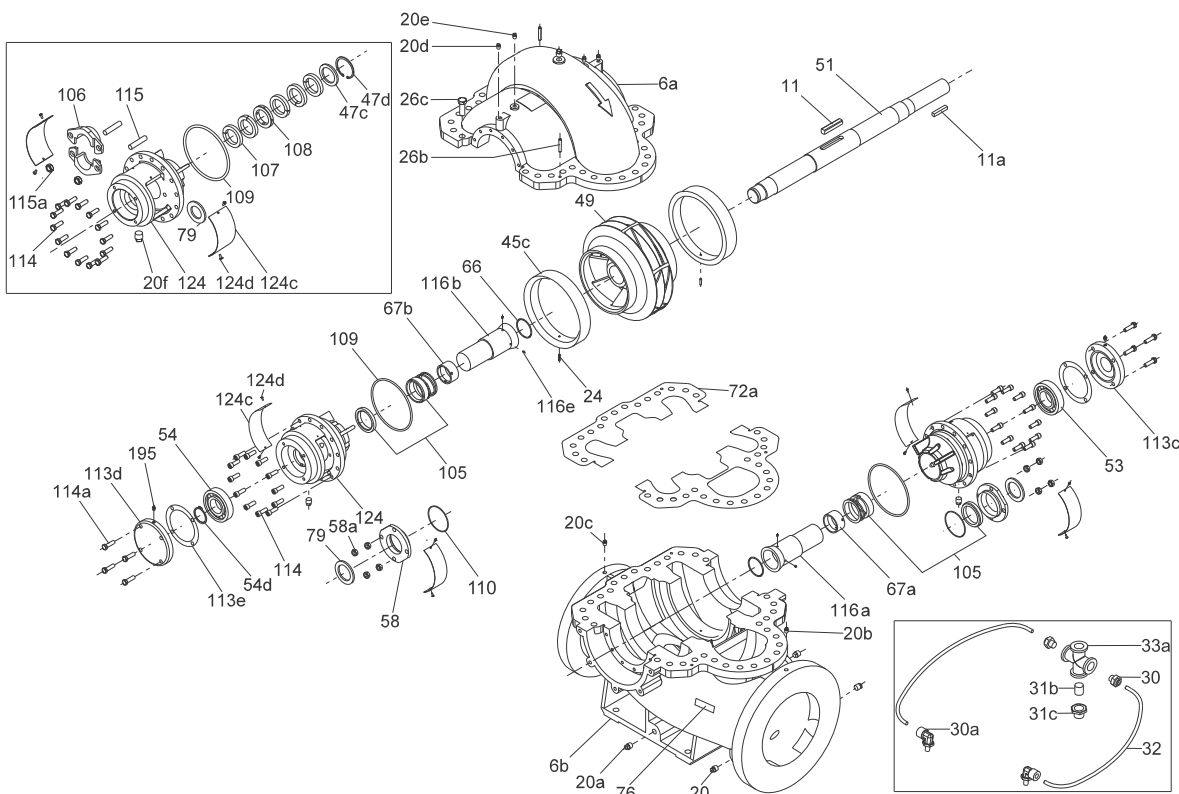


Fig. 20 Construction type 3: LS 300-250-381

TM03 9949 4317

TM03 994 4317

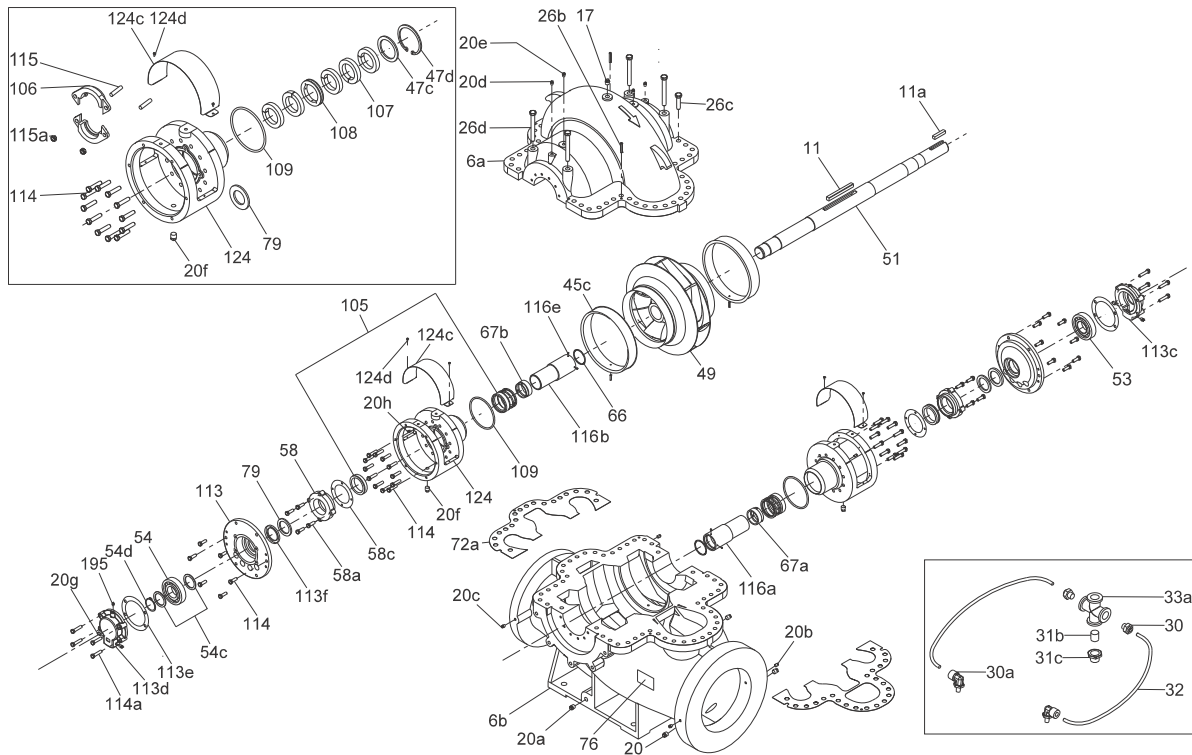


Fig. 23 Construction type 4: LS 200-150-508

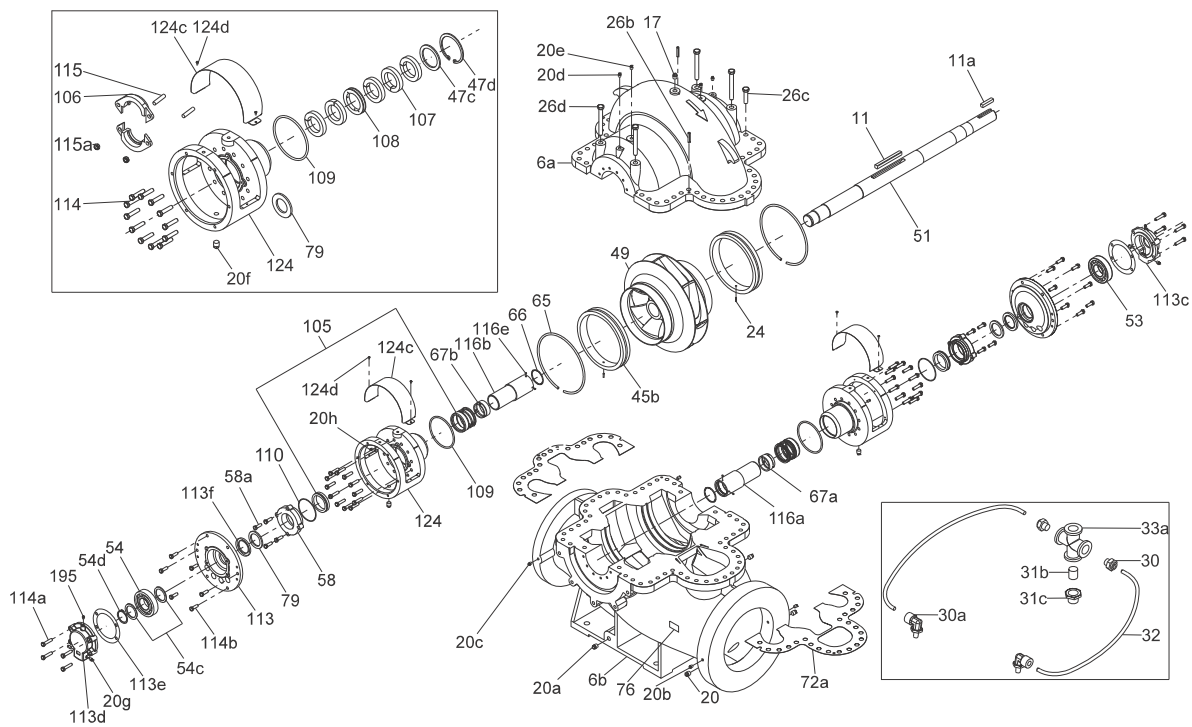
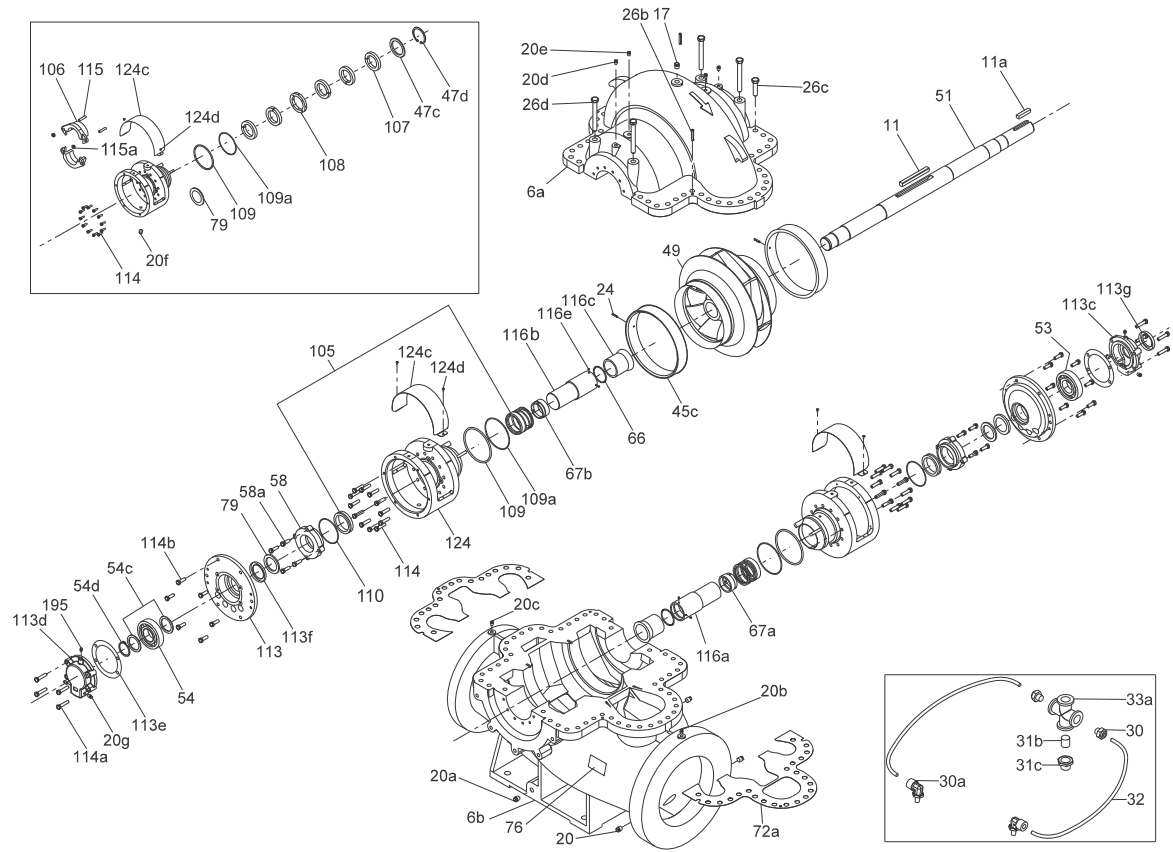


Fig. 24 Construction type 4: LS 200-150-483 X6

TM03 9945 4317

TM03 9946 4317



10.3 LS without sleeve
 10.3.1 Construction type 1

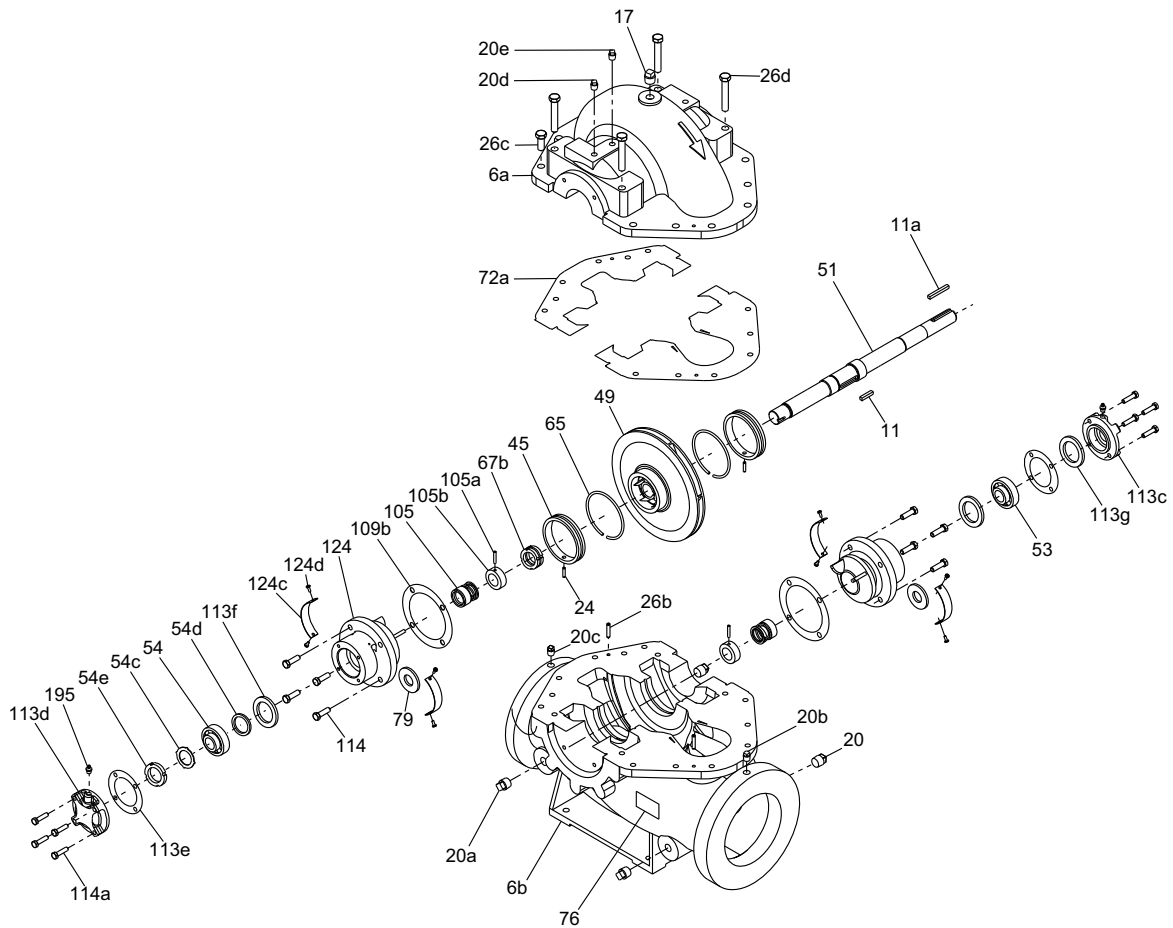


Fig. 26 Construction type 1: LS 65-50-241, LS 65-50-330, LS 100-80-241

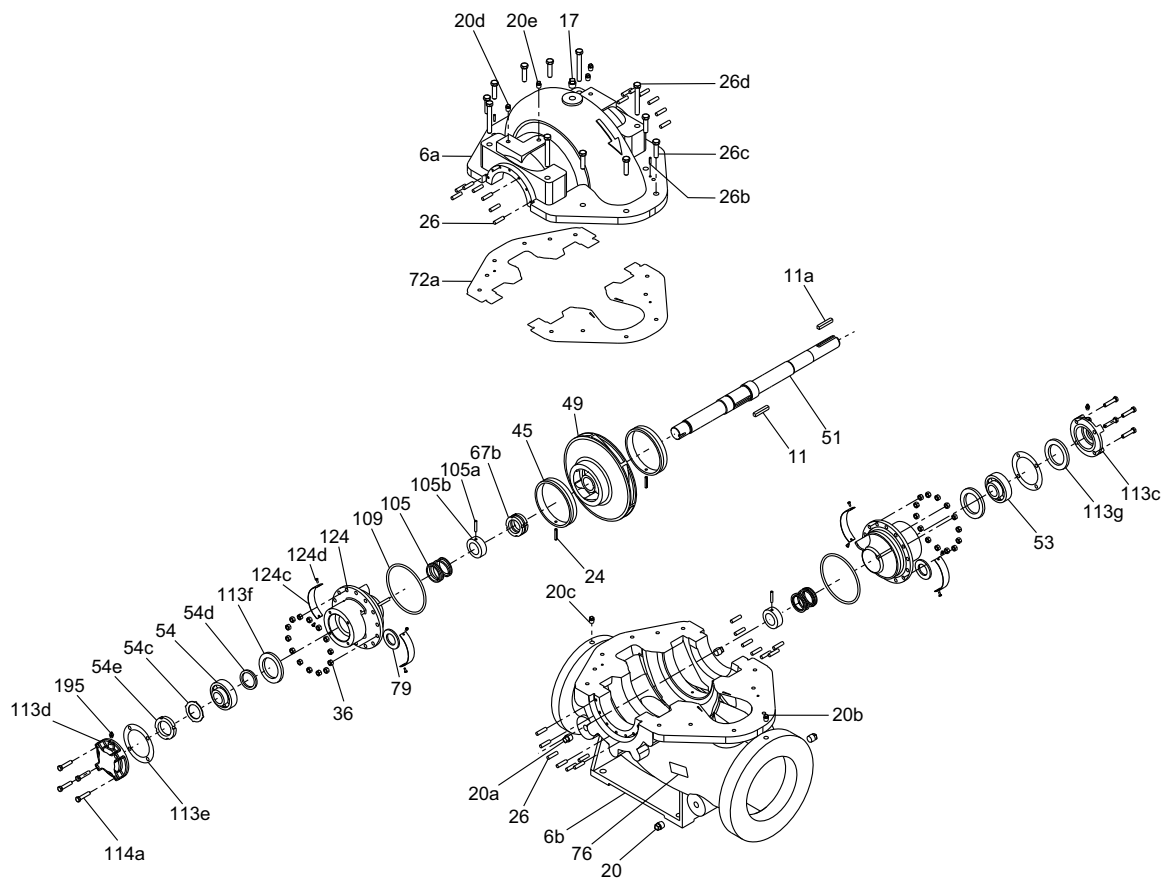


Fig. 27 Construction type 1: LS 100-80-356

TM06 9403 4317

TM06 9405 4317

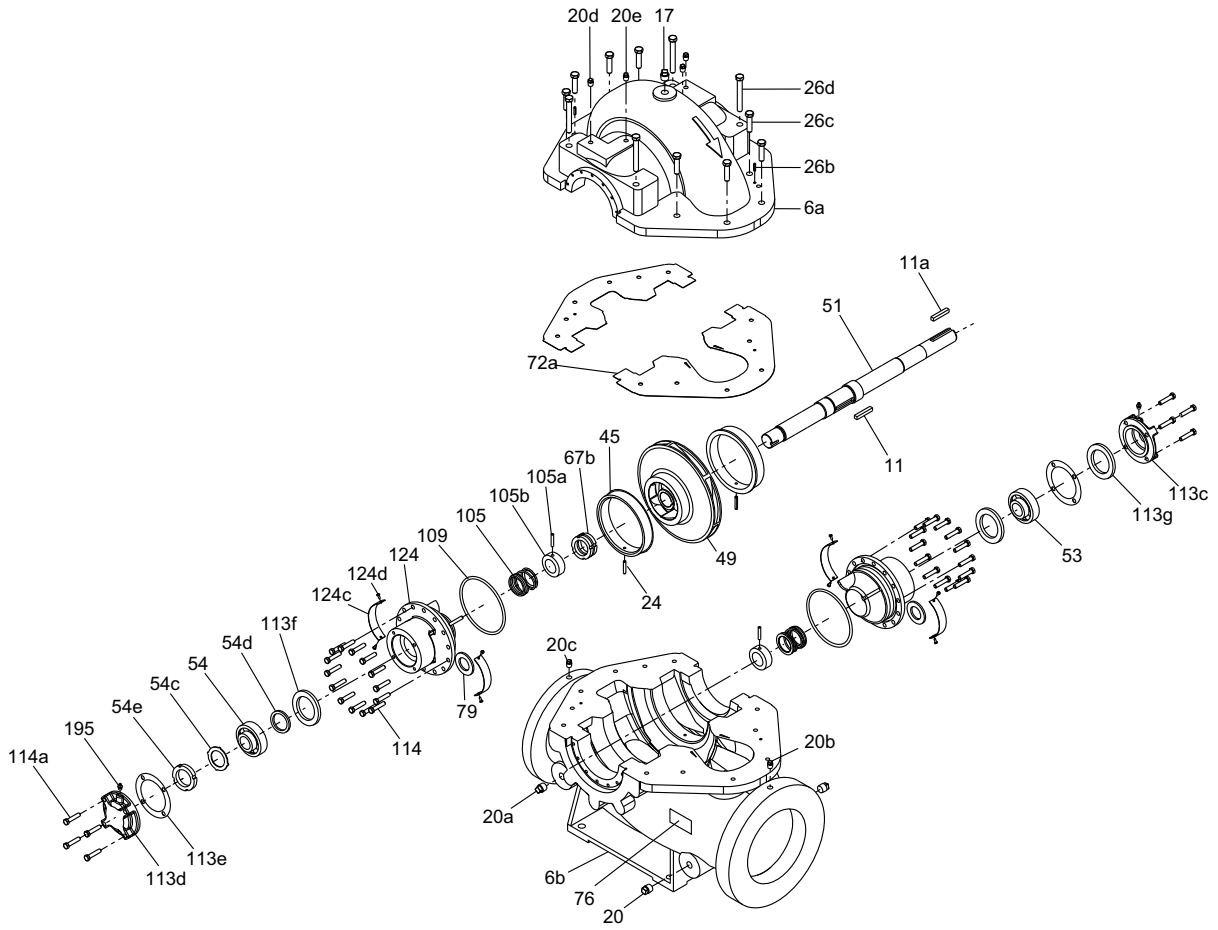


Fig. 28 Construction type 1: LS 150-125-305, LS 150-125-381, LS 200-150-305

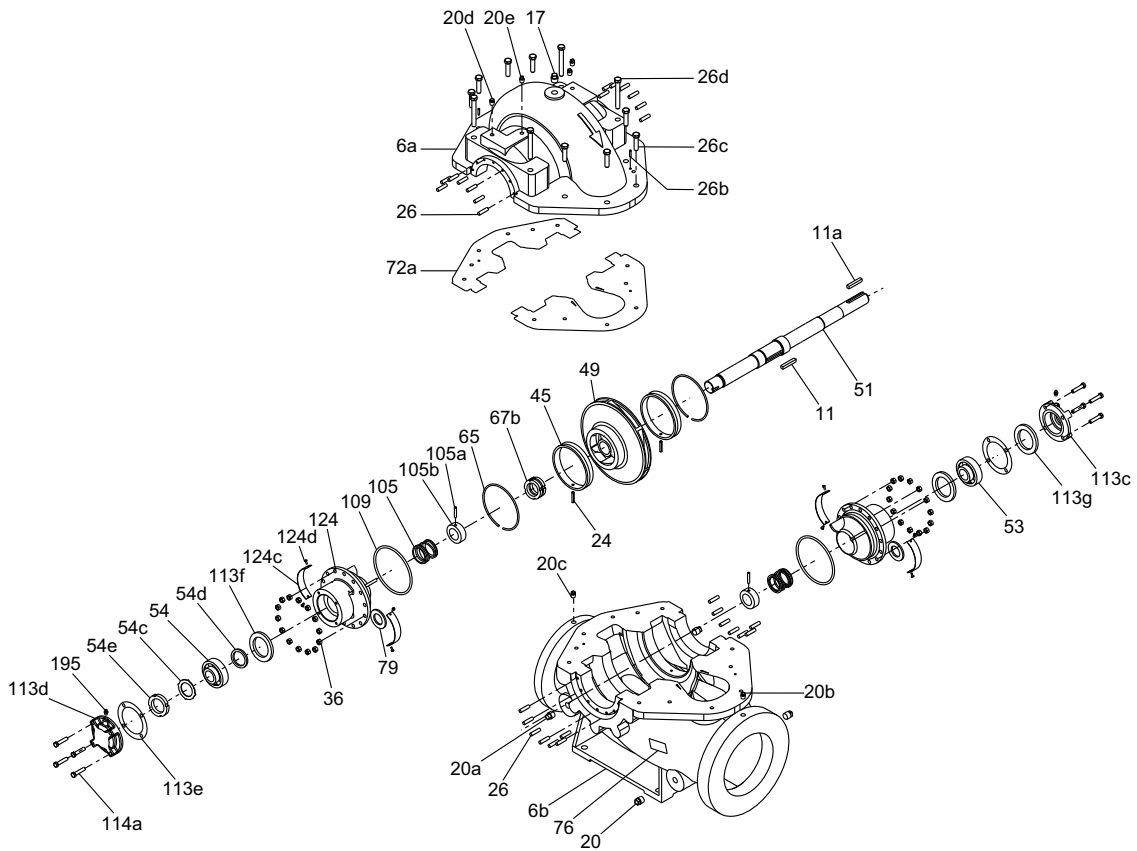


Fig. 29 Construction type 1: LS 125-100-279, LS 125-100-305

TM06 9407 4317

TM06 9406 4317

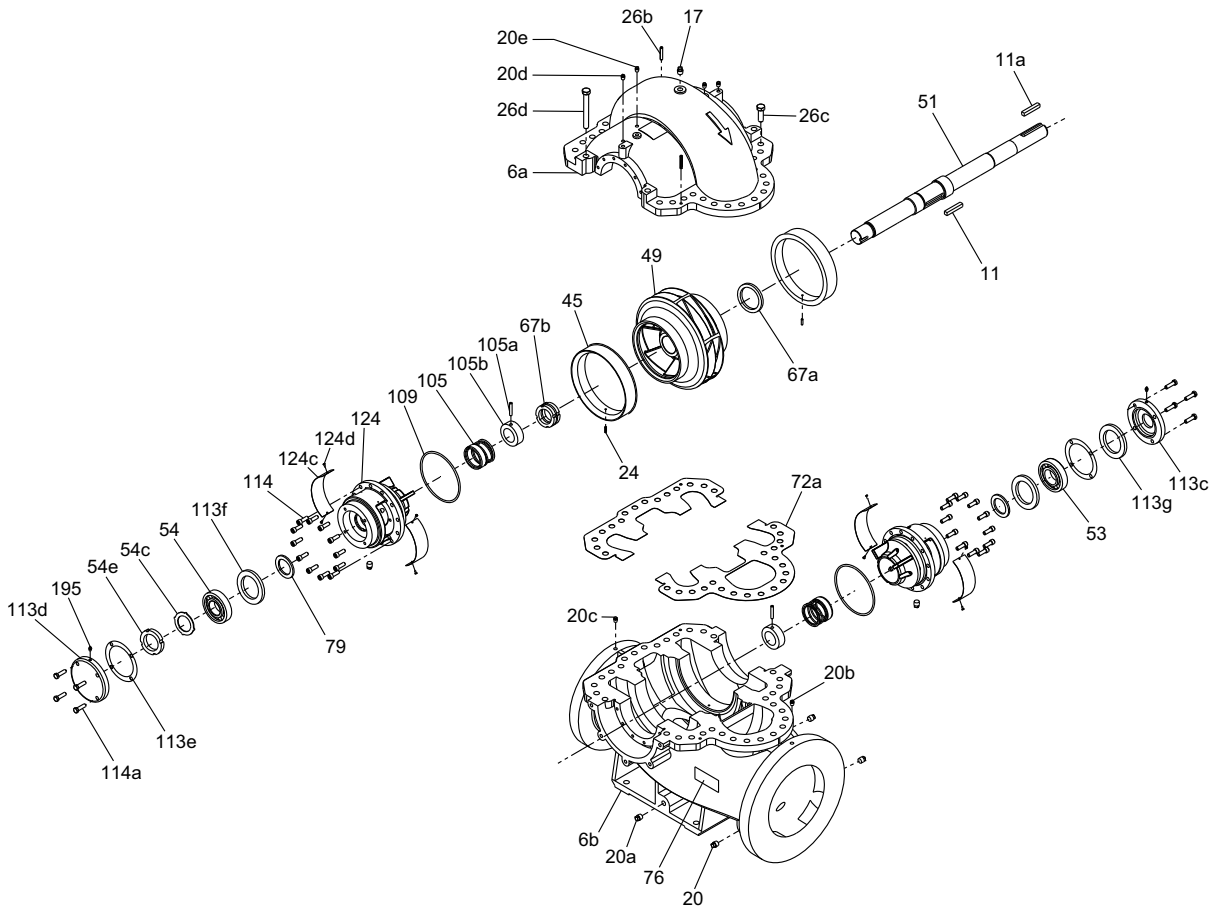


Fig. 32 Construction type 1: LS 200-150-381, LS 250-200-305, LS 250-200-381, LS 300-250-305

TM06 9409 4317

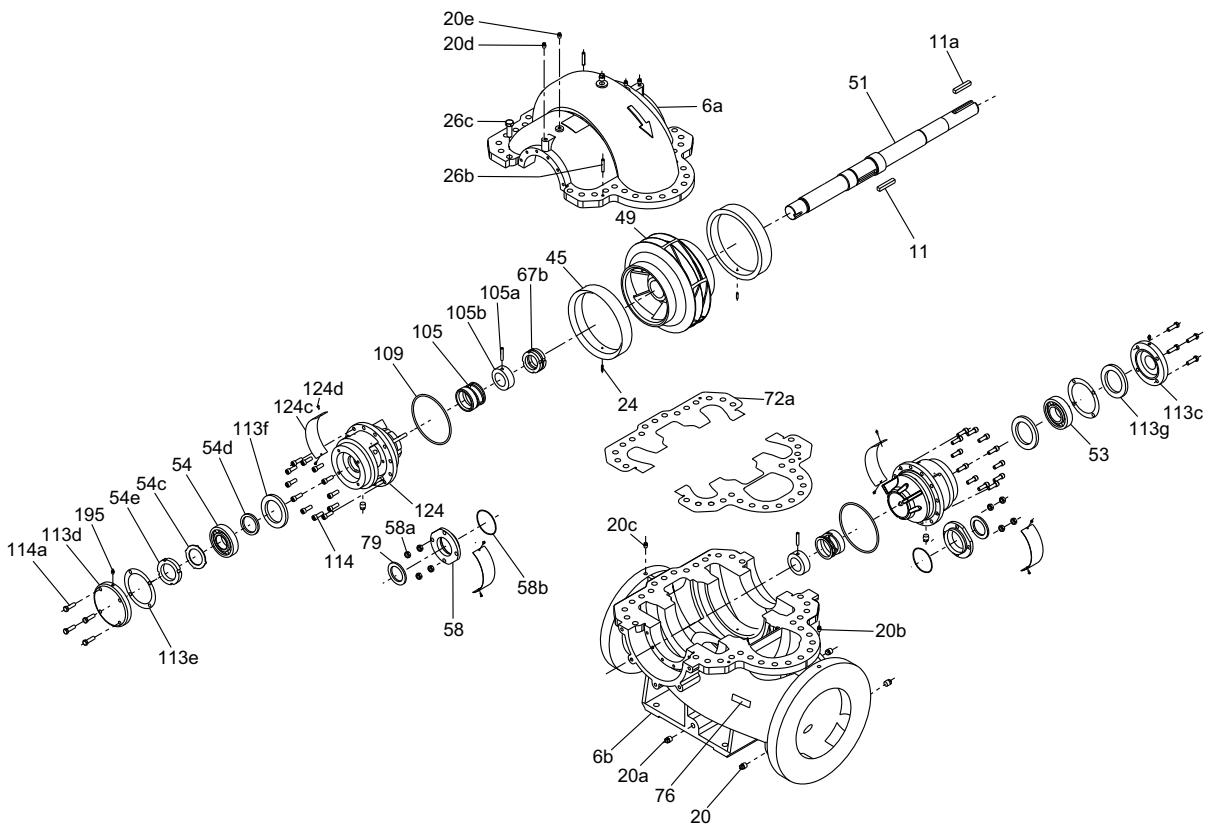


Fig. 33 Construction type 1: LS 300-250-381

TM06 9410 4317

10.3.2 Construction type 2

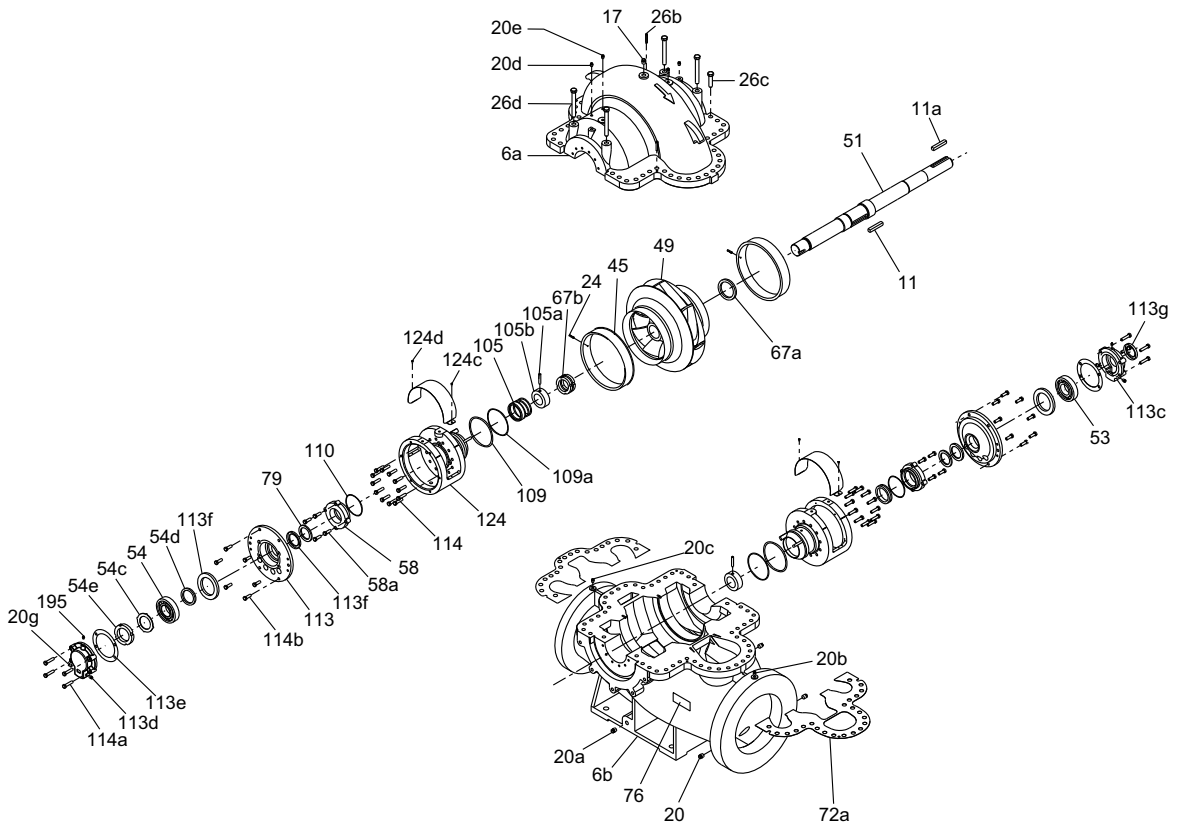


Fig. 34 Construction type 2: LS 350-250-498

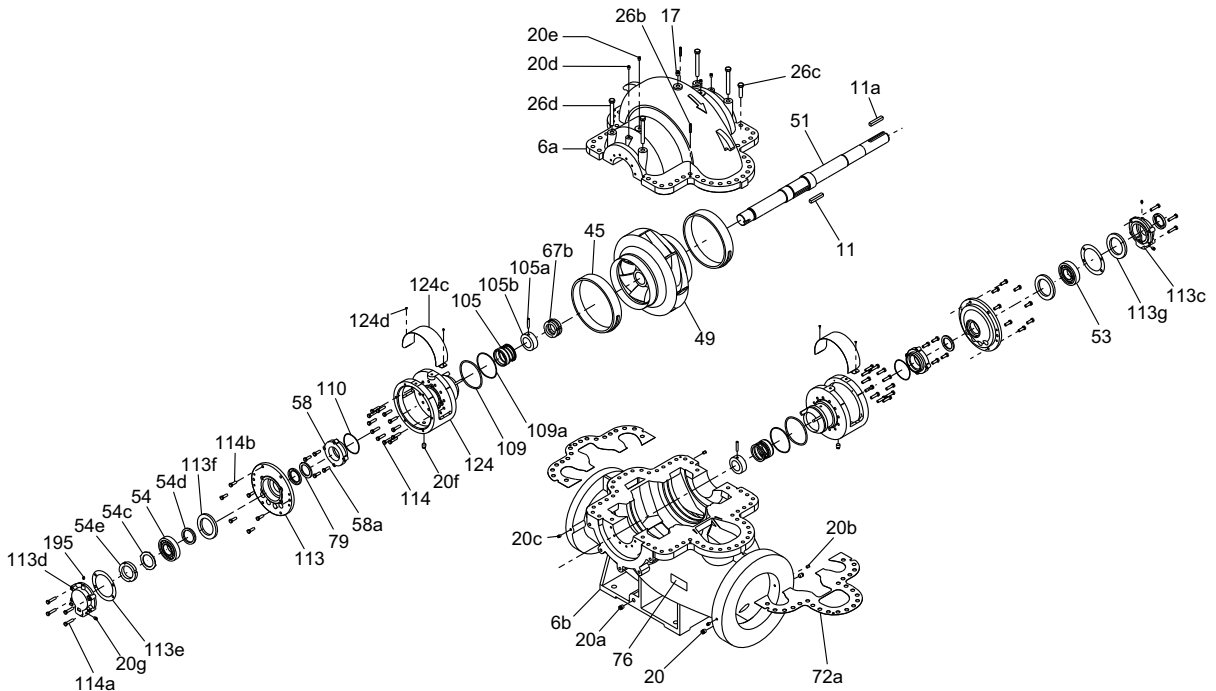


Fig. 35 Construction type 2: LS 450-350-397

TM06 94114 4-317

TM06 94116 4-317

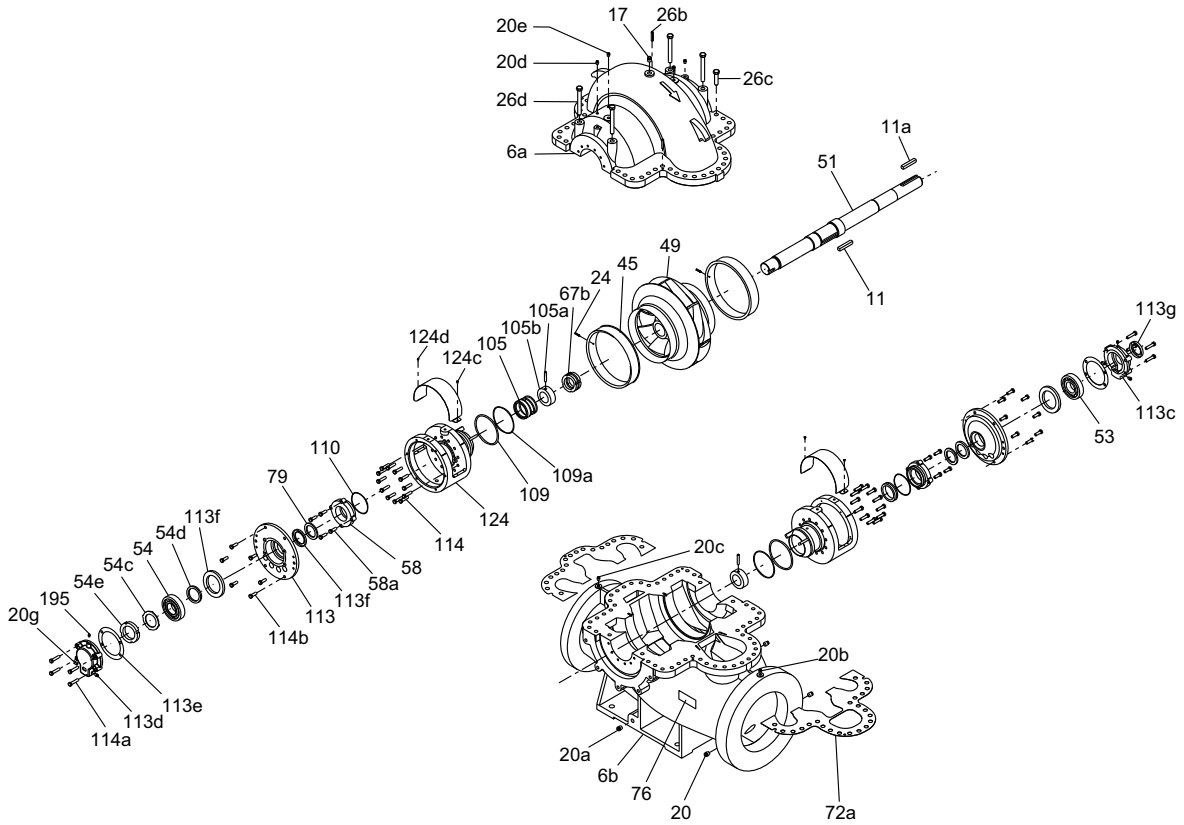


Fig. 36 Construction type 2: LS 350-250-630

TM06 9415 4317

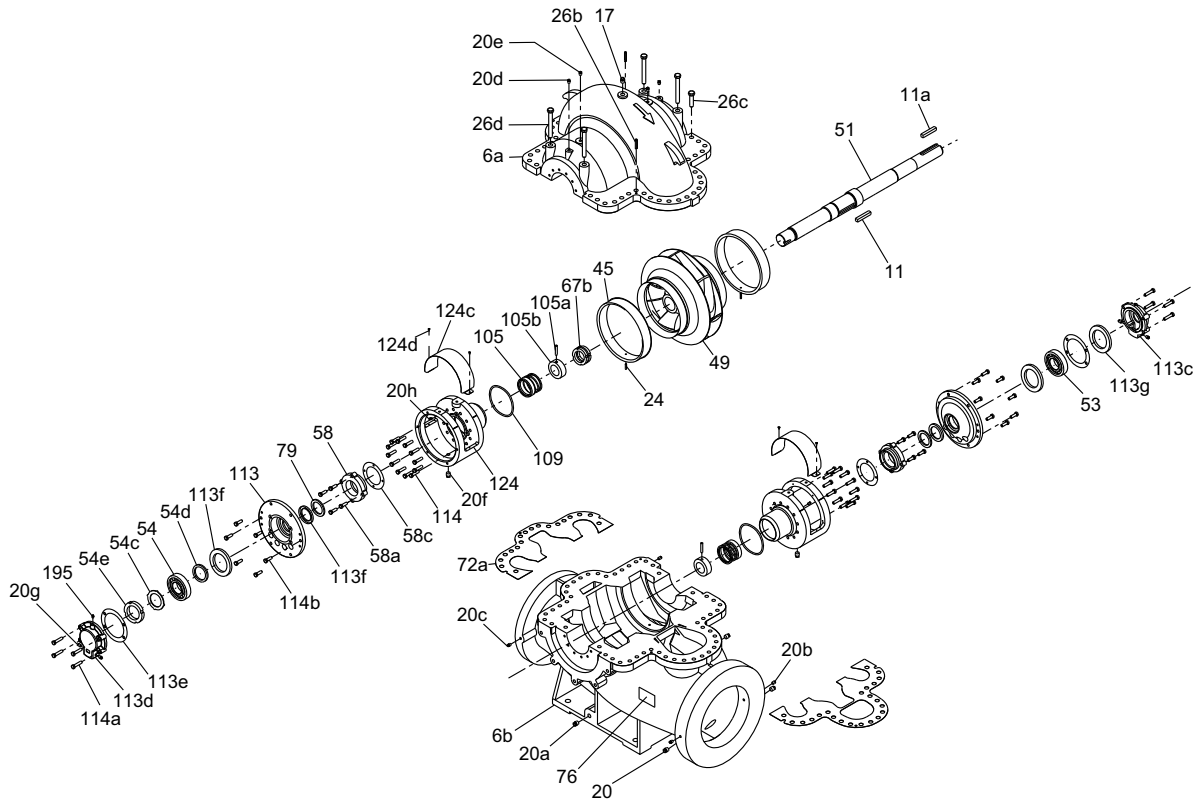


Fig. 37 Construction type 2: LS 200-150-508

TM06 9412 4317

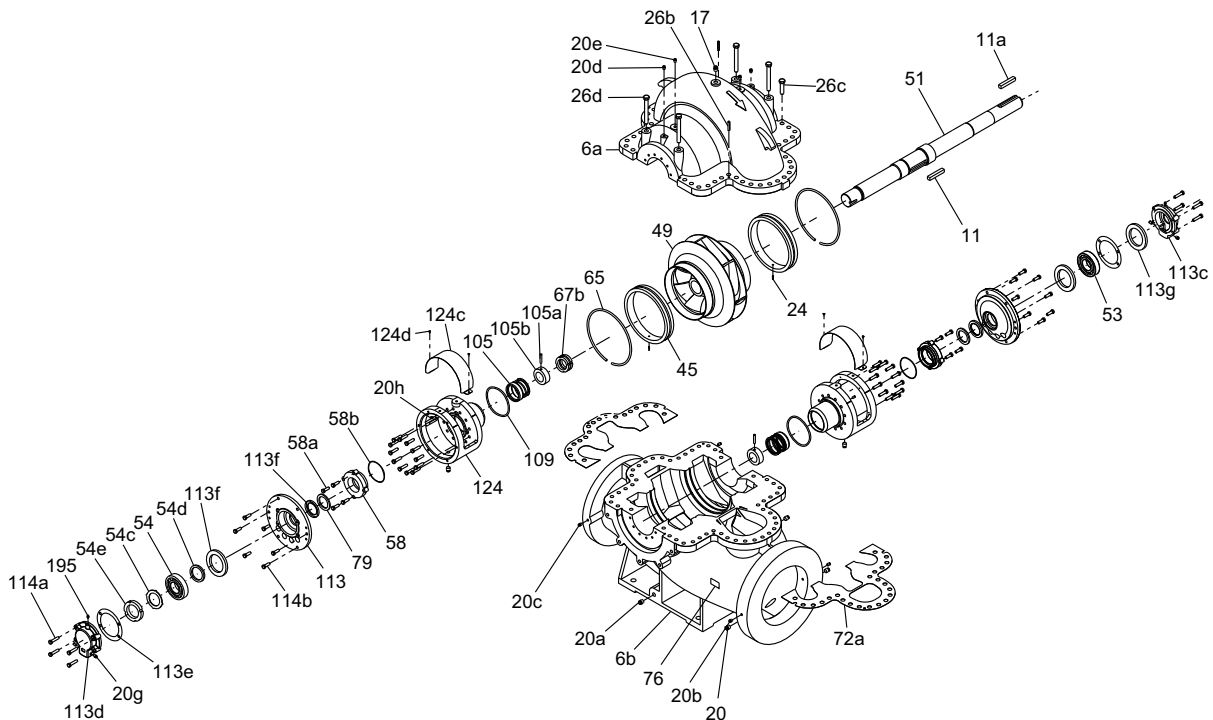


Fig. 38 Construction type 2: LS 200-150-483 X6

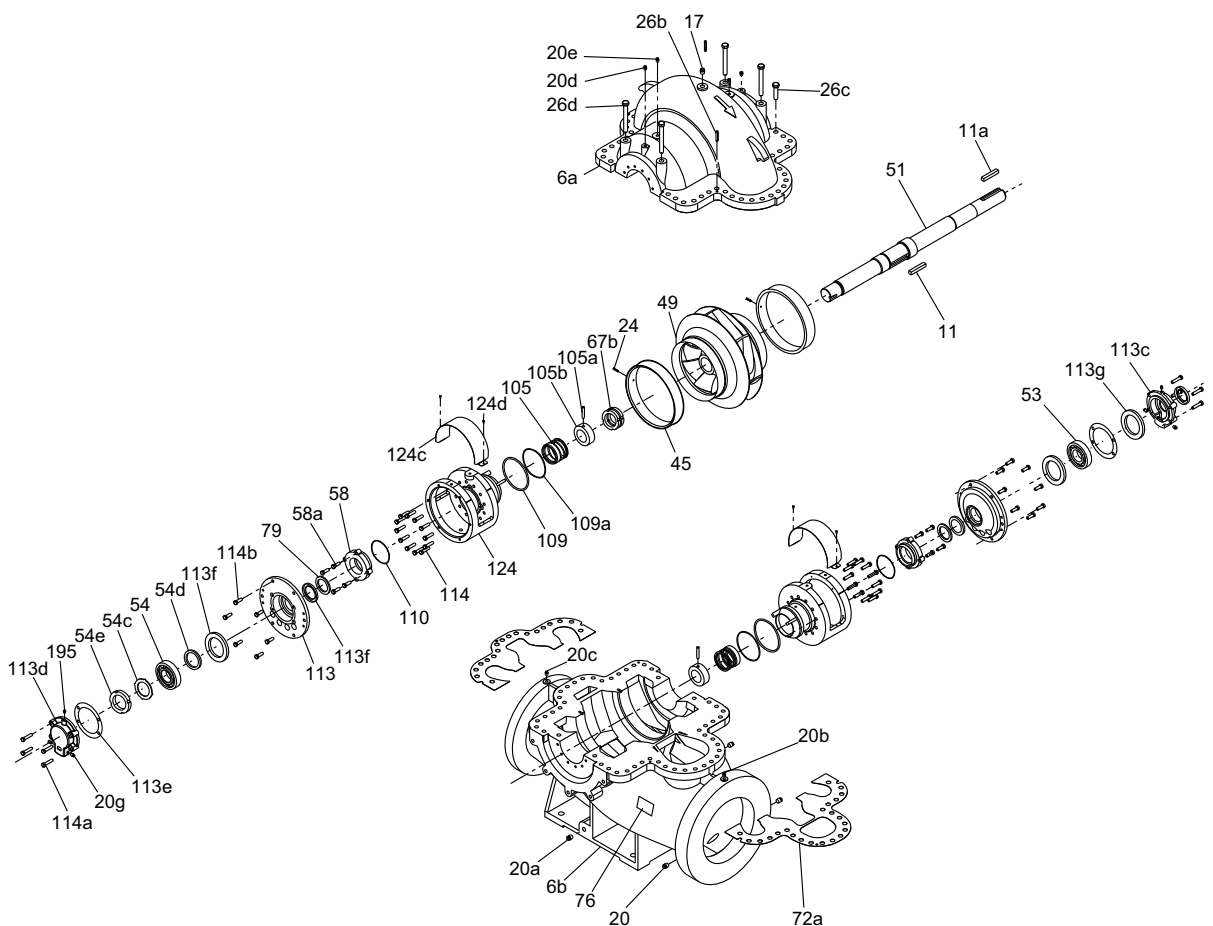


Fig. 39 Construction type 2: LS 300-200-489, LS 350-300-508

TN06 9411 4317

TN06 9413 4317

11. Fault finding the product

DANGER

Electric shock



Death or serious personal injury

- Before you remove the terminal box cover and before you remove or dismantle the pump, make sure that the power supply has been switched off and that it cannot be accidentally switched on.

Faults										Causes
A	B	C	D	E	F	G	H	I	J	K: Reference numbers to remedies.
•									•	The pump is not primed, lack of priming liquid, incomplete priming. 1
•										Loss of priming liquid. 2
•	•		•						•	The suction lift or static lift is too high. 3
•	•									The outlet pressure is too high (measured at the outlet port). 4
•	•	•								The speed is too low. 5
•	•									Wrong direction of rotation. 6
•	•									The impeller is completely clogged. 7
	•									The inlet pipe is partially blocked. 8
	•	•	•				•		•	Air leak in the inlet pipe or flange. 9
	•		•						•	Air leak in the stuffing box. The flushing pipe may be blocked. 10
	•		•	•			•			Cavitation; insufficient NPSH (depending on installation). 11
	•	•		•						The impeller or wear rings are worn. 12
	•	•								Defective packing rings. 13
	•									The non-return valve is too small or partially obstructed. The cross section of the non-return valve port must be at least as large as the cross section of the inlet pipe. 14
	•		•				•			The inlet pipe is not immersed deeply enough. 15
		•								The impeller diameter is too small. This is the most probable cause, if none of the above causes apply. 16
		•								Obstruction in the housing. 17
		•	•	•			•			Air or gases in the liquid. 18
		•		•						The actual duty point of the pump lies to the right of the specified duty point on the pump curve. The result is lower head, higher flow and higher power consumption. 19
				•	•					The viscosity or specific gravity of the pumped liquid is higher than that of water. 20
				•	•	•		•		The shaft is bent due to damage. 21
				•	•	•		•		Mechanical failure of the bearing and/or impeller. 22
				•		•		•		Misalignment. 23
				•	•					Electrical defects. 24
				•	•		•			The speed is too high. 25
						•				The foundation is not rigid enough. 26
								•		The lubricating oil or grease is dirty or contaminated. 27

No.	Cause	Remedy
1	The pump is not primed, lack of priming liquid, incomplete priming.	Fill the pump and inlet pipe completely with pumped liquid.
2	Loss of priming liquid.	Mend possible leaks in the inlet pipe, joints and fittings. Vent the pump housing to remove accumulated air.
3	The suction lift or static lift is too high.	Reduce the difference in height between the water reservoir or water supply and the pump.
4	The outlet pressure is too high.	Make sure that valves in the outlet pipe are fully open. For parallel operation, this indicates that the outlet pressure is higher than designed friction losses in the pipes. Review system design and actual pressure developed in the system with parallel operation.
5	The speed is too low.	Make sure that the motor receives full voltage. Make sure that the frequency is correct. Make sure that all phases are connected.
6	Wrong direction of rotation.	Compare the direction of rotation with the directional arrow on the pump housing. If required, change the direction of rotation by interchanging two phases in the motor.
7	The impeller is completely clogged.	Dismantle the pump and clean the impeller.
8	The inlet pipe is partially blocked.	Remove any obstructions in the inlet pipe.
9	Air leak in the inlet pipe or flange.	Replace or repair the defective pipe section or flange.
10	Air leak in the stuffing box.	Clean the flushing pipe. Replace the stuffing box packing rings, if necessary.
11	Cavitation; insufficient NPSH (depending on installation).	Increase the net positive suction head by placing the pump in a lower position. Pressurise the inlet vessel.
12	The impeller or wear rings are worn.	Replace the impeller and/or wear rings. If necessary, also replace the bearings and the shaft.
13	Defective packing rings.	Replace the packing rings.
14	The non-return valve is too small or partially obstructed.	Replace or clean the non-return valve.
15	The inlet pipe is not immersed deeply enough.	Extend the inlet pipe so that the risk of sucking air is eliminated.
16	The impeller diameter is too small.	Check with Grundfos if you can use a larger impeller. If not, reduce the outlet pipe friction losses. But be careful not to seriously overload the motor.
17	Obstruction in pump housing.	Dismantle the pump and remove the obstruction.
18	Air or gases in the liquid.	Remove the gas or air from the pumped liquid. See 11 above.
19	The actual duty point of the pump lies to the right of the specified duty point on the pump curve. The result is lower head, higher flow and higher power consumption.	Install an orifice plate immediately after the outlet flange. The orifice plate will raise the system characteristic or increase the counterpressure thus increasing the head and lowering the flow. The size of the orifice plate must be adapted so that the pressure corresponds to the required duty point.
20	The viscosity or specific gravity of the pumped liquid is higher than that of water.	Use a larger motor. Consult Grundfos for recommended size. Test the liquid for viscosity and specific gravity.
21	The shaft is bent due to damage.	Check the deflection of the shaft. The total indicator runout must not exceed 0.05 mm. Possibly replace the shaft.
22	Mechanical failure of bearing and/or impeller.	Check the bearings and the impeller for damage. Replace the bearings or the impeller, if necessary.
23	Misalignment.	Realign the pump and motor.
24	Electrical defects.	Check that the voltage and frequency of the power supply are correct. Remedy the possible defects in the motor. Check that the motor is properly cooled.
25	The speed is too high.	Check that the frequency of the power supply corresponds to the frequency stated on the motor nameplate.
26	The foundation is not rigid enough.	Retighten the anchor bolt nuts. Make sure that the foundation is made according to the installation and operating instructions.
27	The lubricating oil or grease is dirty or contaminated.	Clean the bearings and bearing housings according to the instructions and relubricate the bearings.

12. Disposing of the product

This product or parts of it must be disposed of in an environmentally sound way:

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.



The crossed-out wheellie bin symbol on a product means that it must be disposed of separately from household waste. When a product marked with this symbol reaches its end of life, take it to a collection point designated by the local waste disposal authorities. The separate collection and recycling of such products will help protect the environment and human health.

Argentina

Bombas GRUNDFOS de Argentina S.A.
Ruta Panamericana km. 37.500 Centro
Industrial Garin
1619 Garin Pcia. de B.A.
Phone: +54-3327 414 444
Telefax: +54-3327 45 3190

Australia

GRUNDFOS Pumps Pty. Ltd.
P.O. Box 2040
Regency Park
South Australia 5942
Phone: +61-8-8461-4611
Telefax: +61-8-8340 0155

Austria

GRUNDFOS Pumpen Vertrieb Ges.m.b.H.
Grundfosstraße 2
A-5082 Grödig/Salzburg
Tel.: +43-6246-883-0
Telefax: +43-6246-883-30

Belgium

N.V. GRUNDFOS Bellux S.A.
Boomssesteenweg 81-83
B-2630 Aartselaar
Tél.: +32-3-870 7300
Télécopie: +32-3-870 7301

Belarus

Представительство ГРУНДФОС в
Минске
220125, Минск
ул. Шафарнянская, 11, оф. 56, БЦ
«Порт»
Тел.: +7 (375 17) 286 39 72/73
Факс: +7 (375 17) 286 39 71
E-mail: minsk@grundfos.com

Bosnia and Herzegovina

GRUNDFOS Sarajevo
Zmaja od Bosne 7-7A,
BH-71000 Sarajevo
Phone: +387 33 592 480
Telefax: +387 33 590 465
www.ba.grundfos.com
e-mail: grundfos@bih.net.ba

Brazil

BOMBAS GRUNDFOS DO BRASIL
Av. Humberto de Alencar Castelo Branco,
630
CEP 09850 - 300
São Bernardo do Campo - SP
Phone: +55-11 4393 5533
Telefax: +55-11 4343 5015

Bulgaria

Grundfos Bulgaria EOOD
Slatina District
Iztochna Tangenta street no. 100
BG - 1592 Sofia
Tel. +359 2 49 22 200
Fax. +359 2 49 22 201
email: bulgaria@grundfos.bg

Canada

GRUNDFOS Canada Inc.
2941 Brighton Road
Oakville, Ontario
L6H 6C9
Phone: +1-905 829 9533
Telefax: +1-905 829 9512

China

GRUNDFOS Pumps (Shanghai) Co. Ltd.
10F The Hub, No. 33 Suhong Road
Minhang District
Shanghai 201106
PRC
Phone: +86 21 612 252 22
Telefax: +86 21 612 253 33

COLOMBIA

GRUNDFOS Colombia S.A.S.
Km 1.5 vía Siberia-Cota Conj. Potrero
Chico,
Parque Empresarial Arcos de Cota Bod.
1A.
Cota, Cundinamarca
Phone: +57(1)-2913444
Telefax: +57(1)-8764586

Croatia

GRUNDFOS CROATIA d.o.o.
Buzinski prilaz 38, Buzin
HR-10010 Zagreb
Phone: +385 1 6595 400
Telefax: +385 1 6595 499
www.hr.grundfos.com

GRUNDFOS Sales Czechia and Slovakia s.r.o.

Čajkovského 21
779 00 Olomouc
Phone: +420-585-716 111

Denmark

GRUNDFOS DK A/S
Martin Bachs Vej 3
DK-8850 Bjerringbro
Tlf.: +45-87 50 50 50
Telefax: +45-87 50 51 51
E-mail: info_GDK@grundfos.com
www.grundfos.com/DK

Estonia

GRUNDFOS Pumps Eesti OÜ
Peterburi tee 92G
11415 Tallinn
Tel: + 372 606 1690
Fax: + 372 606 1691

Finland

OY GRUNDFOS Pumput AB
Trukkikuja 1
FI-01360 Vantaa
Phone: +358-(0) 207 889 500

France

Pompes GRUNDFOS Distribution S.A.
Parc d'Activités de Chesnes
57, rue de Malacombe
F-38290 St. Quentin Fallavier (Lyon)
Tél.: +33-4 74 82 15 15
Télécopie: +33-4 74 94 10 51

Germany

GRUNDFOS GMBH
Schlüterstr. 33
40699 Erkrath
Tel.: +49-(0) 211 929 69-0
Telefax: +49-(0) 211 929 69-3799
e-mail: infoservice@grundfos.de
Service in Deutschland:
e-mail: kundendienst@grundfos.de

Greece

GRUNDFOS Hellas A.E.B.E.
20th km. Athinon-Markopoulou Av.
P.O. Box 71
GR-19002 Peania
Phone: +0030-210-66 83 400
Telefax: +0030-210-66 46 273

Hong Kong

GRUNDFOS Pumps (Hong Kong) Ltd.
Unit 1, Ground floor
Siu Wai Industrial Centre
29-33 Wing Hong Street &
68 King Lam Street, Cheung Sha Wan
Kowloon
Phone: +852-27861706 / 27861741
Telefax: +852-27858664

Hungary

GRUNDFOS Hungária Kft.
Tópark u. 8
H-2045 Törökbálint,
Phone: +36-23 511 110
Telefax: +36-23 511 111

India

GRUNDFOS Pumps India Private Limited
118 Old Mahabalipuram Road
Thoraiakkam
Chennai 600 096
Phone: +91-44 2496 6800

Indonesia

PT. GRUNDFOS POMPA
Graha Intirub Lt. 2 & 3
Jln. Cililitan Besar No.454. Makasar,
Jakarta Timur
ID-Jakarta 13650
Phone: +62 21-469-51900
Telefax: +62 21-460 6910 / 460 6901

Ireland

GRUNDFOS (Ireland) Ltd.
Unit A, Merrywell Business Park
Ballymount Road Lower
Dublin 12
Phone: +353-1-4089 800
Telefax: +353-1-4089 830

Italy

GRUNDFOS Pompe Italia S.r.l.
Via Gran Sasso 4
I-20060 Truccazzano (Milano)
Tel.: +39-02-95838112
Telefax: +39-02-95309290 / 95838461

Japan

GRUNDFOS Pumps K.K.
1-2-3, Shin-Miyakoda, Kita-ku,
Hamamatsu
431-2103 Japan
Phone: +81 53 428 4760
Telefax: +81 53 428 5005

Korea

GRUNDFOS Pumps Korea Ltd.
6th Floor, Aju Building 679-5
Yeoksam-dong, Kangnam-ku, 135-916
Seoul, Korea
Phone: +82-2-5317 600
Telefax: +82-2-5633 725

Latvia

SIA GRUNDFOS Pumps Latvia
Deglava biznesa centrs
Augusta Deglava ielā 60, LV-1035, Rīga,
Tālr.: + 371 714 9640, 7 149 641
Fakss: + 371 914 9646

Lithuania

GRUNDFOS Pumps UAB
Smolensko g. 6
LT-03201 Vilnius
Tel: + 370 52 395 430
Fax: + 370 52 395 431

Malaysia

GRUNDFOS Pumps Sdn. Bhd.
7 Jalan Peguam U1/25
Glenmarie Industrial Park
40150 Shah Alam
Selangor
Phone: +60-3-5569 2922
Telefax: +60-3-5569 2866

Mexico

Bombas GRUNDFOS de México S.A. de
C.V.
Boulevard TLC No. 15
Parque Industrial Stiva Aeropuerto
Apodaca, N.L. 66600
Phone: +52-81-8144 4000
Telefax: +52-81-8144 4010

Netherlands

GRUNDFOS Netherlands
Veluwezoom 35
1326 AE Almere
Postbus 22015
1302 CA ALMERE
Tel.: +31-88-478 6336
Telefax: +31-88-478 6332
E-mail: info_gnl@grundfos.com

New Zealand

GRUNDFOS Pumps NZ Ltd.
17 Beatrice Tinsley Crescent
North Harbour Industrial Estate
Albany, Auckland
Phone: +64-9-415 3240
Telefax: +64-9-415 3250

Norway

GRUNDFOS Pumper A/S
Stromsveien 344
Postboks 235, Leirdal
N-1011 Oslo
Tlf.: +47-22 90 47 00
Telefax: +47-22 32 21 50

Poland

GRUNDFOS Pompy Sp. z o.o.
ul. Klonowa 23
Baranowo k. Poznania
PL-62-081 Przeźmierowo
Tel: (+48-61) 650 13 00
Fax: (+48-61) 650 13 50

Portugal

Bombas GRUNDFOS Portugal, S.A.
Rua Calvet de Magalhães, 241
Apartado 1079
P-2770-153 Paço de Arcos
Tel.: +351-21-440 76 00
Telefax: +351-21-440 76 90

Romania

GRUNDFOS Pompe România SRL
Bd. Biruintei, nr 103
Pantelimon county Ilfov
Phone: +40 21 200 4100
Telefax: +40 21 200 4101
E-mail: romania@grundfos.ro

Russia

ООО Грундфос Россия
ул. Школьная, 39-41
Москва, RU-109544, Russia
Тел. (+7) 495 564-88-00 (495) 737-30-00
Факс (+7) 495 564 8811
E-mail grundfos.moscow@grundfos.com

Serbia

Grundfos Srbija d.o.o.
Omladinskih brigada 90b
11070 Novi Beograd
Phone: +381 11 2258 740
Telefax: +381 11 2281 769
www.rs.grundfos.com

Singapore

GRUNDFOS (Singapore) Pte. Ltd.
25 Jalan Tukang
Singapore 619264
Phone: +65-6681 9688
Telefax: +65-6681 9689

Slovakia

GRUNDFOS s.r.o.
Prievozská 4D
821 09 BRATISLAVA
Phona: +421 2 5020 1426
sk.grundfos.com

Slovenia

GRUNDFOS LJUBLJANA, d.o.o.
Leskoškova 9e, 1122 Ljubljana
Phone: +386 (0) 1 568 06 10
Telefax: +386 (0) 1 568 06 19
E-mail: tehnika-si@grundfos.com

South Africa

Grundfos (PTY) Ltd.
16 Lascelles Drive, Meadowbrook Estate
1609 Germiston, Johannesburg
Tel.: (+27) 10 248 6000
Fax: (+27) 10 248 6002
E-mail: lgradidge@grundfos.com

Spain

Bombas GRUNDFOS España S.A.
Camino de la Fuentecilla, s/n
E-28110 Algete (Madrid)
Tel.: +34-91-848 8800
Telefax: +34-91-628 0465

Sweden

GRUNDFOS AB
Box 333 (Lunnagårdsgatan 6)
431 24 Mölndal
Tel.: +46 31 332 23 000
Telefax: +46 31 331 94 60

Switzerland

GRUNDFOS Pumpen AG
Bruggacherstrasse 10
CH-8117 Fällanden/ZH
Tel.: +41-44-806 8111
Telefax: +41-44-806 8115

Taiwan

GRUNDFOS Pumps (Taiwan) Ltd.
7 Floor, 219 Min-Chuan Road
Taichung, Taiwan, R.O.C.
Phone: +886-4-2305 0868
Telefax: +886-4-2305 0878

Thailand

GRUNDFOS (Thailand) Ltd.
92 Chaloe Phrakiat Rama 9 Road,
Dokmai, Pravej, Bangkok 10250
Phone: +66-2-725 8999
Telefax: +66-2-725 8998

Turkey

GRUNDFOS POMPA San. ve Tic. Ltd. Sti.
Gebze Organize Sanayi Bölgesi
Ihsan dede Caddesi,
2. yol 200. Sokak No. 204
41490 Gebze/ Kocaeli
Phone: +90 - 262-679 7979
Telefax: +90 - 262-679 7905
E-mail: satis@grundfos.com

Ukraine

Бізнес Центр Європа
Столицне шосе, 103
м. Київ, 03131, Україна
Телефон: (+38 044) 237 04 00
Факс: (+38 044) 237 04 01
E-mail: ukraine@grundfos.com

United Arab Emirates

GRUNDFOS Gulf Distribution
P.O. Box 16768
Jebel Ali Free Zone
Dubai
Phone: +971 4 8815 166
Telefax: +971 4 8815 136

United Kingdom

GRUNDFOS Pumps Ltd.
Grovebury Road
Leighton Buzzard/Beds. LU7 4TL
Phone: +44-1525-850000
Telefax: +44-1525-850011

U.S.A.

GRUNDFOS Pumps Corporation
9300 Loiret Blvd.
Lenexa, Kansas 66219
Phone: +1-913-227-3400
Telefax: +1-913-227-3500

Uzbekistan

Grundfos Tashkent, Uzbekistan The Repre-
sentative Office of Grundfos Kazakhstan in
Uzbekistan
38a, Oybek street, Tashkent
Телефон: (+998) 71 150 3290 / 71 150
3291
Факс: (+998) 71 150 3292

Addresses Revised 15.01.2019

99613935 0419

ECM: 1259735
