

KRD/NKZ/GPN/GSD/GSZL Series

Submersible Slurry Pumps

GSZ Series

Submersible High-Head Dewatering Pumps

OPERATION MANUAL

INTRODUCTION

Thank you for selecting the Tsurumi KRD/NKZ/GPN/GSD/GSZ/GSZL Series submersible slurry pumps. This operation manual provides product information as well as precautions for safe and reliable operations. To avoid possible malfunction or an accident, acknowledge them thoroughly beforehand of pump operation. Using the pump for applications other than those listed in this manual or failure to observe the precautions may lead to a malfunction or an accident. And in such a case, the manufacturer will not take any liability. Therefore, keep this manual in an easily accessible place, so that the precautions/information can be referred to as needed. In addition, this operation manual should remain with the pump if rented or resold. If the operation manual gets lost or damaged, ask your nearest dealer or Tsurumi representative for another copy. Similarly, if you cannot troubleshoot the problem(s) with the information provided in the manual or if have queries regarding the operation, service, repair, or maintenance of the submersible pump, please contact the Tsurumi pump dealer nearby your place. The contents of this document may not be copied in whole or in part without the express permission of Tsurumi Manufacturing Co., Ltd.

CONTENTS

1. BE SURE TO READ FOR YOUR SAFETY	1
2. NAME OF PARTS	4
3. PRIOR TO OPERATION	7
4. INSTALLATION	9
5. ELECTRICAL WIRING	12
6. OPERATION.....	16
7. MAINTENANCE AND INSPECTION.....	19
8. DISASSEMBLY AND REASSEMBLY	21
9. TROUBLESHOOTING	29

1 BE SURE TO READ FOR YOUR SAFETY

Be sure to thoroughly read and understand the SAFETY PRECAUTIONS given in this section before using the equipment in order to operate the equipment correctly.

The precautionary measures described in this section are intended to prevent danger or damage to you or to others. The contents of this manual that could possibly be performed improperly are classified into two categories: **⚠ WARNING**, and **⚠ CAUTION**. The categories indicate the extent of possible damage or the urgency of the precaution. Note however, that what is included under **⚠ CAUTION** may at times lead to a more serious problem. In either case, the categories pertain to safety-related items, and as such, must be observed carefully.

- **⚠ WARNING** : Operating the equipment improperly by failing to observe this precaution may possibly lead to death or injury to humans.
- **⚠ CAUTION** : Operating the equipment improperly by failing to observe this precaution may possibly cause injury to humans and other physical damage.
- **NOTE** : Gives information that does not fall in the WARNING or CAUTION categories.

● Explanation of Symbols:



: The \triangle mark indicates a WARNING or CAUTION item. The symbol inside the mark describes the precaution in more detail ("electrical shock", in the case of the example on the left).



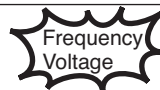
: The \odot mark indicates a prohibited action. The symbol inside the mark, or a notation in the vicinity of the mark describes the precaution in more detail ("disassembly prohibited", in the case of the example on the left).



: The \bullet mark indicates an action that must be taken, or instructs how to perform a task. The symbol inside the mark describes the precaution in more detail ("provide ground work", in the case of the example on the left).












PRECAUTIONS TO THE PRODUCT SPECIFICATIONS

⚠ WARNING	
	● This pump is designed to pump only water that is not intended for human consumption. Other uses can result in injury to the operator or damage to the pump and other property.
⚠ CAUTION	
	● Do not operate the product under any conditions other than those for which it is specified. Failure to observe the precaution can lead to electrical leakage, electrical shock, fire, water overflow or other problems.


















PRECAUTIONS DURING TRANSPORT AND INSTALLATION

⚠ WARNING	
	● When transporting the product, pay close attention to its center of gravity and mass. Use an appropriate lifting equipment to lift the unit. Improper lifting may result in the fall of the product which could cause damage of the product or human injury.
	● Electrical wiring should be performed in accordance with all applicable regulations in your country. Absolutely provide a dedicated earth leakage circuit breaker and a thermal overload relay suitable for the product (available on the market). Imperfect wiring or improper protective equipment can lead to electrical leakage, fire, or explosion in the worst case.
	● Install the product properly in accordance with this instruction manual. Improper installation may result in electrical leakage, electrical shock, fire, water leakage, or injury.
	● Provide a secure grounding dedicated for the product. Never fail to provide an earth leakage circuit breaker and a thermal overload relay in your starter or control panel (Both available on the market). If an electrical leakage occurs by due to a product failure, it may cause electrical shock.
	● This pump is neither dust-proof nor explosion-proof. Do not use it at a dusty place or at a place where toxic, corrosive or explosive gas is present. Use in such places could cause fire or explosion, resulting in property damage, serious personal injury, and/or death.

 CAUTION			
	<ul style="list-style-type: none"> ● Be sure to provide a ground wire securely. Do not connect the ground wire to a gas pipe, water pipe, lightning rod, or telephone ground wire. Improper grounding could cause electrical shock. 		<ul style="list-style-type: none"> ● Attach a hose securely to the hose coupling. Imperfect connection of hose could cause water leakage which may result in the damage of nearby walls, floors, and other equipment.
	<ul style="list-style-type: none"> ● Do not scratch, fold, twist, make alterations, or bundle the cable, or use it as a lifting device. The cable may be damaged, which may cause electrical leakage, short-circuit, electrical shock, or fire. 		<ul style="list-style-type: none"> ● Do not use the cable if it is damaged. Connect every conductor of the cable securely to the terminals. Failure to observe this can lead to electrical shock, short-circuit, or fire. 
	<ul style="list-style-type: none"> ● When the product will be carried by hand, decide the number of persons considering the mass of the product. When lifting up the product, do not attempt to do it by simply bowing from the waist. Use the knees, too, to protect your back. 		<ul style="list-style-type: none"> ● Use the handle when installing or carrying the pump. Never use the cable to carry or to suspend. Doing so may damage the cable which could cause electrical leakage, short circuit, or fire. When lifting the unit, attach a rope or chain securely to the handle.
	<ul style="list-style-type: none"> ● If a hose is used for the discharge line, take a measure to prevent the hose from shaking. If the hose shakes, you may be wet or injured. 		

PRECAUTIONS DURING TEST OPERATION AND OPERATION

 WARNING			
	<ul style="list-style-type: none"> ● Never try to operate the product if somebody is present in the pool, spa or sump. If an electrical leakage occurs, it will result in death or serious injury. 		<ul style="list-style-type: none"> ● When changing power connection is needed to correct the direction of rotation, be sure to turn off the power supply (earth leakage circuit breaker, etc.), and perform the work after making sure that the impeller has stopped completely. Failure to do so may lead to electrical shock, short-circuit, or injury. 
	<ul style="list-style-type: none"> ● Never start the pump while it is suspended, as the unit may jerk and could lead to injury. 		
	<ul style="list-style-type: none"> ● Do not use this pumping equipment to pump/move flammable or explosive liquids such as oil, gasoline, kerosene, ethanol, etc. Using this pump with flammable liquids can cause an explosion or fire, resulting in property damage, serious personal injury, and/or death. 		<ul style="list-style-type: none"> ● Do not use the product for hot or warm liquid over 40°C, as doing so will damage the product, which may lead to electrical leakage or electrical shock. 
 CAUTION			
	<ul style="list-style-type: none"> ● Do not operate the product under any voltage other than described on the nameplate with the voltage tolerance limit within $\pm 5\%$. If it is operated with a generator, it is strongly suggested not to operate other equipment with the same generator. Failure to observe this caution may cause malfunction and breakdown of the product, which may lead to electrical leakage or electrical shock. 		<ul style="list-style-type: none"> ● Do not touch the product with bare hands during or immediate after the operation, as the product may become very hot during operation. Failure to observe this caution may lead to be burned.
			<ul style="list-style-type: none"> ● Do not run the product dry or operate it with its gate valve closed, as doing so will damage the product, which may lead to electrical leakage or electrical shock.
	<ul style="list-style-type: none"> ● Do not pump oil, salt water, chemicals, corrosives, or organic solvents as media of the sort will damage the pump, which may lead to serious injury. 		<ul style="list-style-type: none"> ● When the product will not be used for an extended period, be sure to turn off the power supply (earth leakage circuit breaker, etc.). Deterioration of the insulation may lead to electrical leakage, electrical shock, or fire.
	<ul style="list-style-type: none"> ● Do not allow a finger or foreign object (pin, wire, etc.) to enter the suction inlet of the pump. Failure to observe this caution could lead to injury or cause it to malfunction or to operate abnormally, which may lead to electrical leakage or electrical shock. 		

PRECAUTIONS DURING MAINTENANCE AND INSPECTION

⚠ WARNING



● Absolutely turn off the power supply or disconnect the plug before starting maintenance or inspection. Do not work with wet hands. **Failure to observe these cautions may lead to electrical shock or injury.**



● In case any abnormality (excessive vibration, unusual noise or odor) is found in the operation, turn the power off immediately and consult with the dealer where it was purchased or Tsurumi representative. **Continuing to operate the product under abnormal conditions may result in electrical shock, fire, or water leakage.**



● Do not disassemble or repair any parts other than those designated in the operation manual. If repairs are necessary in any other than the designated parts, consult with the dealer where it was purchased or Tsurumi representative. **Improper repairs can result in electrical leakage, electrical shock, fire, or water leakage.**

⚠ CAUTION



● After reassembly, always perform a test operation before resuming use of the product. **Improper assembly can result in electrical leakage, electrical shock, fire, or water leakage.**

PRECAUTION TO POWER OUTAGE

⚠ WARNING



● In case of power outage, turn off the power supply. **The product will resume operation when the power is restored, which presents serious danger to people in the vicinity.**

OTHER PRECAUTION

⚠ CAUTION



● Never use the product for potable water. **It may present a danger to human health.**

● Do not pump water containing corrosive chemicals or toxic substances. **These fluids can cause serious health and environmental hazards. If you need assistance, contact your local authorities.**



⚠ CAUTION



● This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

● Children should be supervised to ensure that they do not play with the appliance.

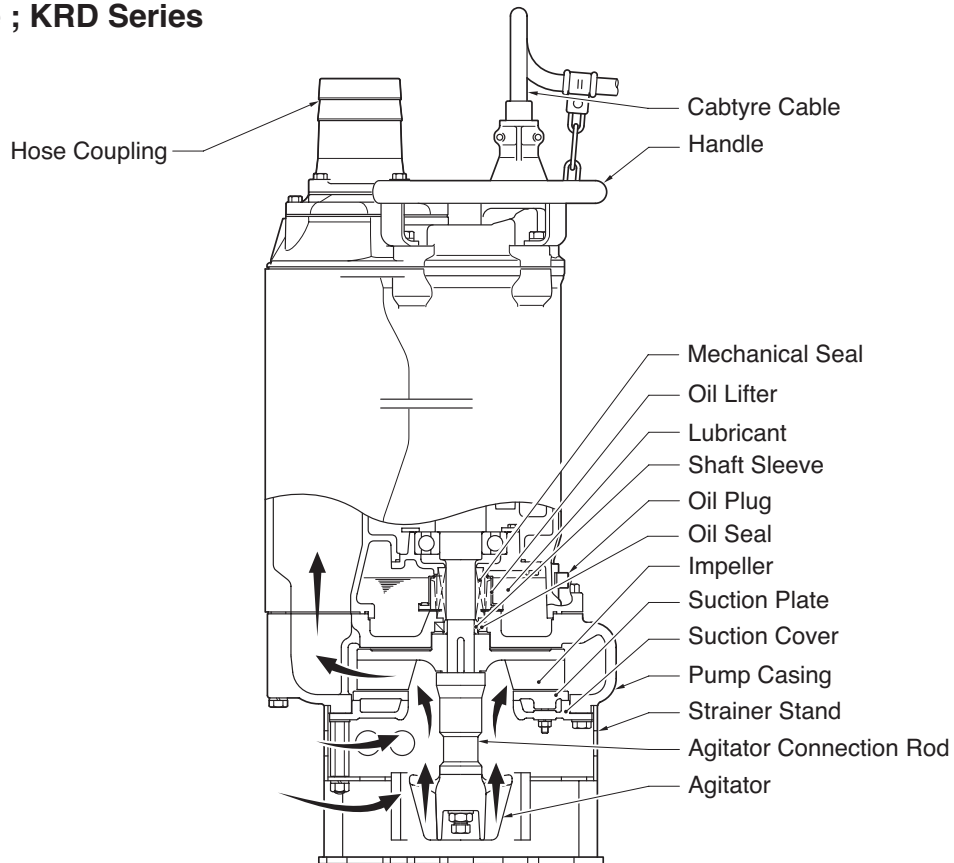
● If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

● Pollution of the liquid could occur due to leakage of lubricants.

● The pump must be supplied through a residual current device (RCD) having a rated residual operating current not exceeding 30 mA.

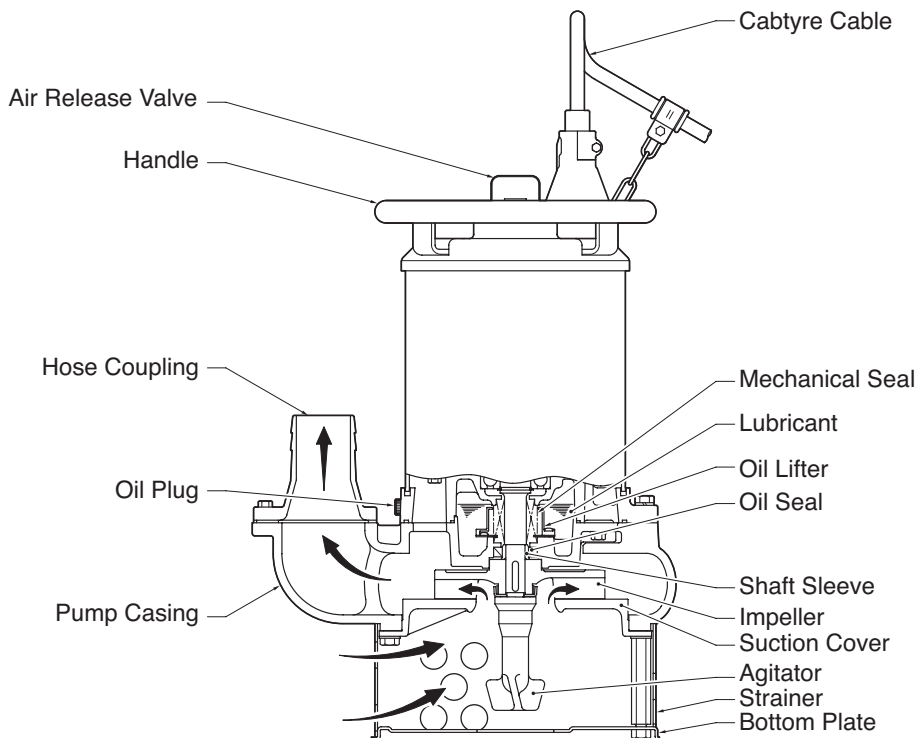
2 NAME OF PARTS

■ Example ; KRD Series



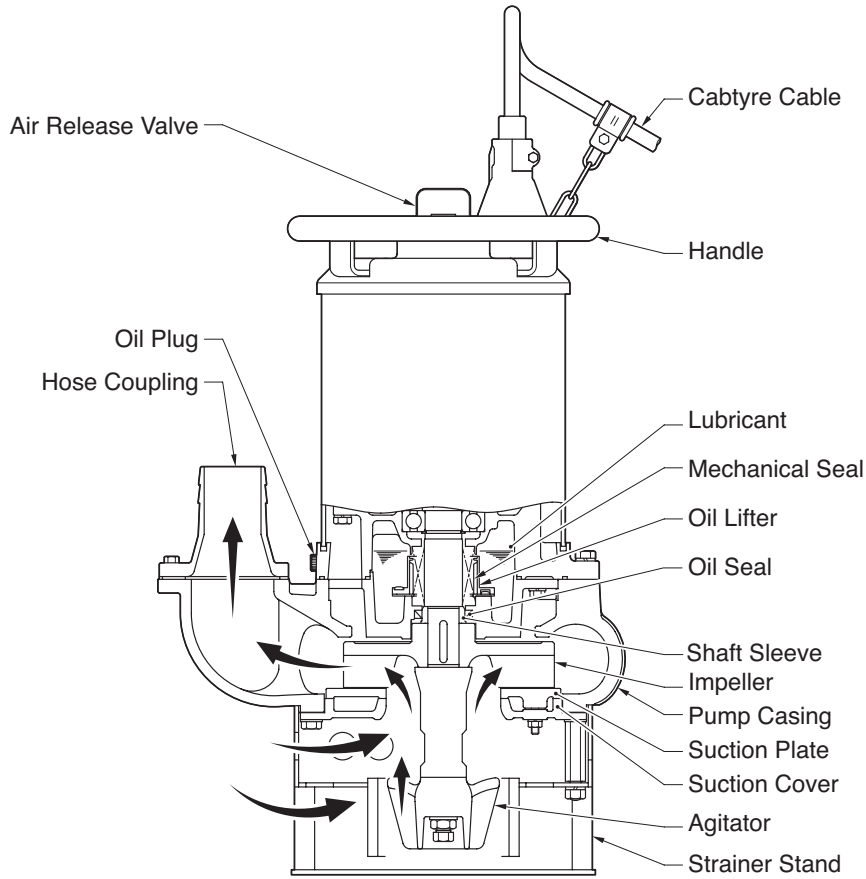
Note: *The above diagram is typical of the KRD47.5, but some models may vary slightly in appearance or internal structure.*

■ Example ; NKZ Series



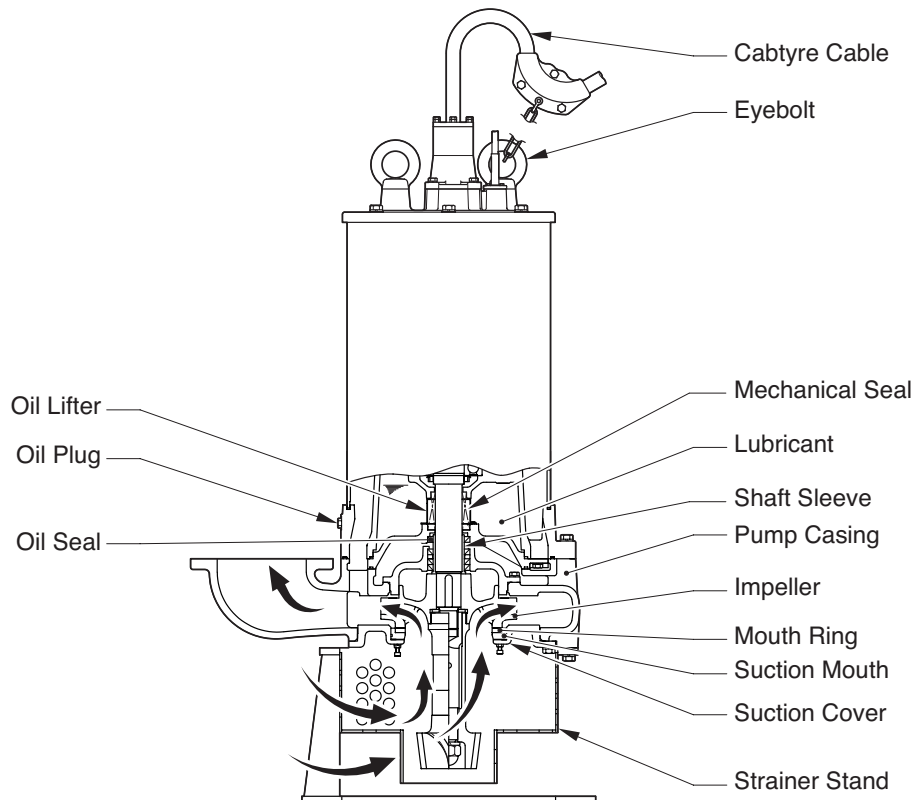
Note: *The above diagram is typical of the NKZ43.7, but some models may vary slightly in appearance or internal structure.*

■ Example ; GPN Series



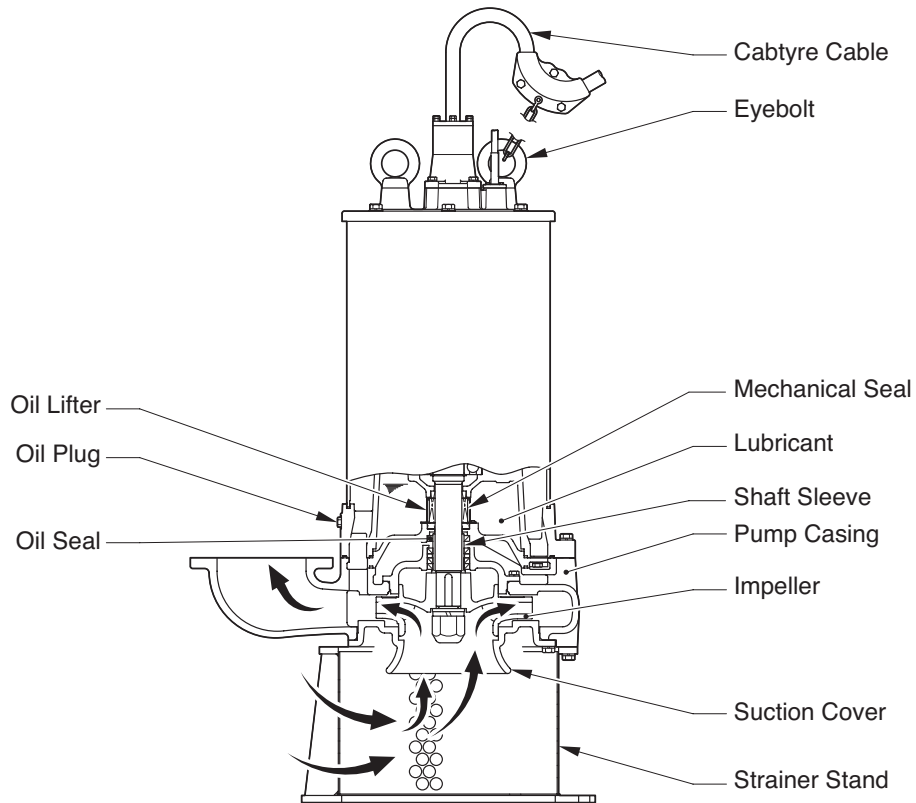
Note: *The above diagram is typical of the GPN35.5, but some models may vary slightly in appearance or internal structure.*

■ Example ; GSD Series



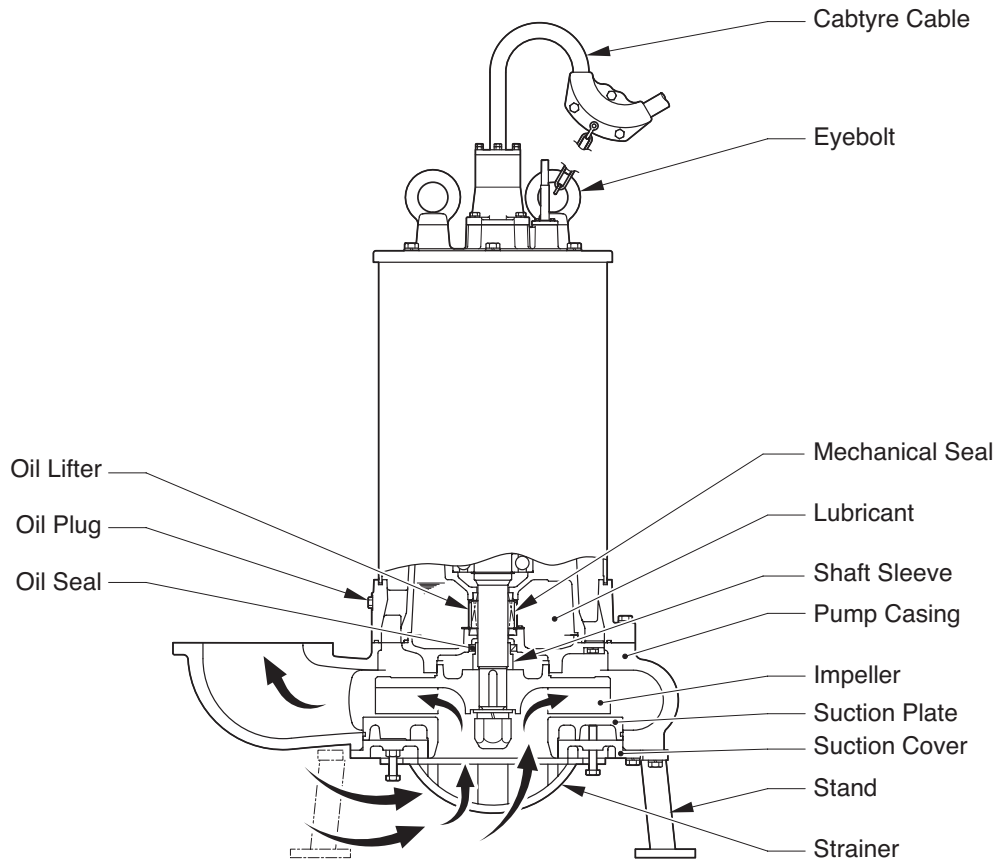
Note: *The above diagram is typical of the GSD837, but some models may vary slightly in appearance or internal structure.*

■ Example ; GSZ Series



Note: *The above diagram is typical of the GSZ837, but some models may vary slightly in appearance or internal structure.*

■ Example ; GSZL Series



Note: *The above diagram is typical of the GSZL837, but some models may vary slightly in appearance or internal structure.*

3 PRIOR TO OPERATION

When the pump is delivered, first perform the following checks.

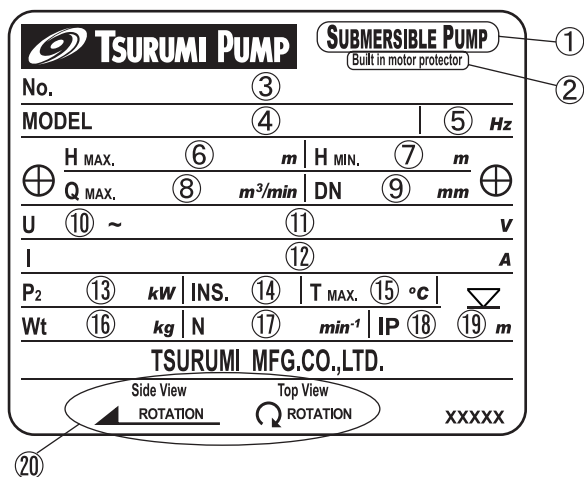
Inspection

While unpacking, inspect the product for damage during shipment, and make sure all bolts and nuts are tightened properly.

Specification Check

Check the model number to make sure it is the product that was ordered. Be certain it is the correct voltage and frequency.

Example of nameplate



1	Submersible pump	11	Rated voltage
2	Built in motor protector	12	Rated current
3	Serial number	13	Rated output power
4	Model	14	Insulation class
5	Frequency	15	Max. liquid temperature
6	Max. total head	16	Weight without cable
7	Min. total head	17	Speed of rotation
8	Max. flow rate	18	IP degree of protection
9	Discharge bore	19	Max. immersion depth
10	Phase	20	Direction of rotation

Note: If you discover any damage or discrepancy, please contact with the Tsurumi dealer from whom you purchased the product or the nearest Tsurumi representative office.

Accessory Check

Verify that all accessory items are included in the package.

- Operation Manual 1

Note: If you discover any damage or discrepancy in the product, please contact the dealer where this equipment was purchased or the Tsurumi sales office in your area.

Product Specifications

CAUTION Do not operate this product under any conditions other than those for which it is specified. Failure to observe this precaution can lead to electrical shock, electrical leakage, fire, water leakage or other problems.

Major Standard Specifications

Fluid	Property	Rain water, Ground water, Mud and Sand carrying Water, Slurry ; 0 ~ 40°C
Pump	Impeller	Semi-Open-Type, Close-Type (GSD, GSZ)
	Shaft Seal	Double Mechanical Seal
	Bearing	Shielded Ball Bearing
Motor	Specification	Dry type Submersible Induction Motor , 4, 6-pole
	Insulation	Class F
	Protection System (Built-in)	Circle Thermal Protector, Miniature Protector (GSD, GSZ(L)), Leak Sensor (Electrode), (GPN 22kw Option, GSD 37kW Option, GSZ(L) 22~150kW Option)
	Lubricant	Turbine oil VG32 (non-additive)
Discharge Connection		Hose Coupling, JIS 10K Flange (GSD, GSZ(L))

■ Standard specifications (50/60Hz)

Model	Bore (mm) (inch)	Phase	Starting Method	Output (kW)	Max Head (m) (feet)	Max Capacity (m ³ /min) (GPM)	Weight (kg)
KRD35.5	80	3	Direct-on-Line	5.5	15.8 / 14.8	1.67 / 1.70	107
	3						
KRD47.5	100	3	Direct-on-Line	7.5	17.1 / 17.2	2.35 / 2.25	154
	4						
KRD611	150	3	Direct-on-Line	11	22.0 / 24.1	3.25 / 3.30	175 / 167
	6						
NKZ32.2-51	80	3	Direct-on-Line	2.2	11.6	1.4	102
	3						
NKZ33.7-51/61	80	3	Direct-on-Line	3.7	17	1.54 / 1.60	107
	3				- / 56	- / 423	
NKZ43.7-51	100	3	Direct-on-Line	3.7	17	1.54	104
	4						
NKZ35.5-51/61	80	3	Direct-on-Line	5.5	24.9 / 24.7	1.53 / 1.73	146
	3						
NKZ45.5-51/61	100	3	Direct-on-Line	5.5	18.7 / 18.5	2.0	129
	4						
NKZ411-51/61	100	3	Direct-on-Line	11	28.8 / 29	2.44 / 2.46	217
	4						
NKZ611-51/61	150	3	Direct-on-Line	11	21.7 / 21.5	3.95 / 4.0	210
	6						
GPN35.5	80	3	Direct-on-Line	5.5	16.3 / 16.0	1.90 / 1.88	160
	3				- / 52.5	- / 497	
GPN411	100	3	Direct-on-Line	11	19.3 / 19.4	3.25	239
	4				- / 64	859	
GPN415	100	3	Direct-on-Line	15	21.5 / 24.2	4.11 / 4.3	242
	4				- / 79	- / 1136	
GPN422	100	3	Direct-on-Line	22	35 / 36	3.7 / 3.45	430
	4				- / 118	- / 911	
GPN622	150	3	Direct-on-Line	22	30 / 28.5	5 / 5.18	435
	6				- / 94	- / 1368	
GSD837	200	3	Star Delta	37	39 / 40	6.30 / 6.50	695
	8		Direct-on-Line		- / 131	- / 1717	
GSZ637	150	3	Star Delta	37	60.0	4.95 / 4.80	605
	6		Direct-on-Line		197	- / 1268	
GSZ837	200	3	Star Delta	37	44.0 / 44.5	8.40 / 8.00	575
	8		Direct-on-Line		- / 146	- / 2113	
GSZ845	200	3	Star Delta	45	46.2 / 46.5	9.10 / 9.30	615
	8		Direct-on-Line		- / 153	- / 2457	
GSZL822	200	3	Direct-on-Line	22	21.5 / 23.0	9.00 / 8.50	725
	8				- / 75	- / 2245	
GSZL837	200	3	Star Delta	37	28.6 / 27.5	10.50 / 11.00	830
	8		Direct-on-Line		- / 90	- / 2906	
GSZ10150	250	3	Star Delta	150	54.5 / 59	18 / 19	2650
	10				179 / 194	4755 / 5019	

Note: The weight (mass) given above is the operating weight of the pump itself, not including the cabtyre cable.

4 INSTALLATION

CAUTION

- Do not use this pump in liquids other than water, such as oil, salt water, or organic solvents.
- Use with a power supply voltage tolerance within $\pm 5\%$ of the rated voltage.
- Do not use in water temperatures outside the range of 0 ~ 40°C, which can lead to failure, electrical leakage or shock.
- Do not use in the vicinity of explosive or flammable materials.
- Use only in fully assembled state.

Note: Consult your local dealer or Tsurumi representative before using with any liquids other than those indicated in this document.

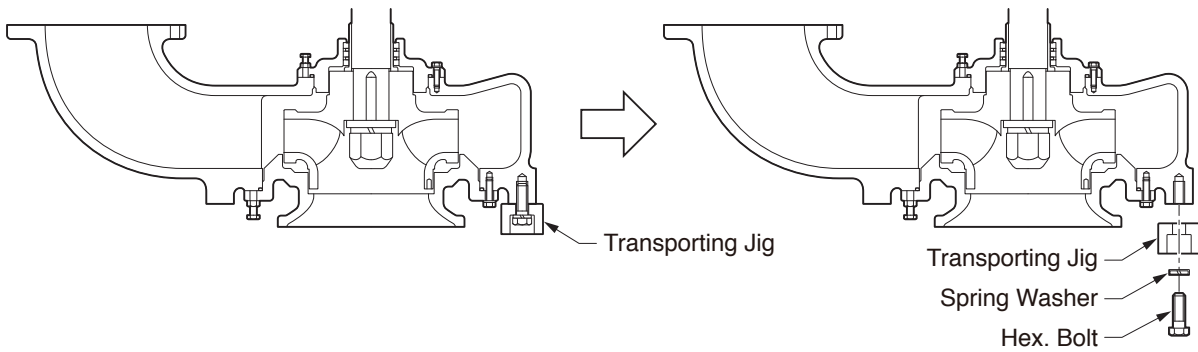
INSTALLATION PROCEDURE AND INSTRUCTION

Before installing Pump Strainer Stand to the Pump, please confirm you have all the parts by referring to the parts list below.

Model	Parts List
GSZ10150	Strainer Stand 1Pcs
	Hex. Bolt M24x75L 8Pcs
	Spring Washer M24 8Pcs

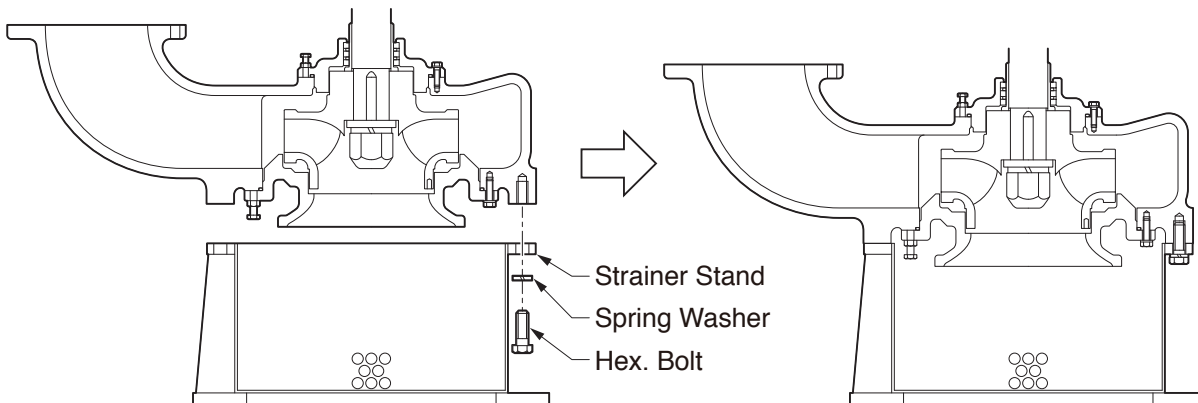
Procedure

- (1) Remove 4 Transporting Jig and 4 Hex. Bolt (M24x65L), 4 Spring Washer (M24) from the Pump.



Before installing the Pump Strainer Stand

- (2) Install the Strainer Stand to Pump and 8 Hex. Bolt (M24x75L), 8 Spring Washer (M24) to the Pump.
- ※ Bolts (M24X75L) and Spring Washer (M24) included in the Parts list to install Strainer stand into the Pump.
 - ※ Please do not use Hex.Bolts (M24×65L), which removed at the procedure (1).



After installing the Pump Strainer Stand

Maximum allowable water pressure



CAUTION

Do not use at greater than the water pressure shown below, which can damage the pump resulting in electrical leakage and electrical shock.

Model	Maximum allowable water pressure
KRD / NKZ Series	0.3 MPa (3 kgf/cm ²) - discharge pressure used
GPN Series except for GPN422 / GSZL Series	0.4 MPa (4 kgf/cm ²) - discharge pressure used
GSD / GSZ Series	0.4 MPa (4 kgf/cm ²)
GPN422	0.5 MPa (5 kgf/cm ²) - discharge pressure used

Preparing for installation

Before installing the pump at a work site, you will need to have the following tools and instruments ready:

- Insulation resistance tester
- AC voltmeter
- AC ammeter (clamp-on type)
- Bolt and nut tighteners
- Power supply connection tools (screwdriver or box wrench)

Note: Please also read the instructions that come with each of the test instruments.

Checks to make before installation

Use the megohmmeter to measure the motor insulation resistance between the cabtyre cable plug tips and ground lead (Green or Green/Yellow).

Note: The reference insulation resistance (20M Ω or greater) is the value when the pump is new or has been repaired. For the reference value after installation, see below at section "7.Maintenance and Inspection".

Precautions in installation



WARNING

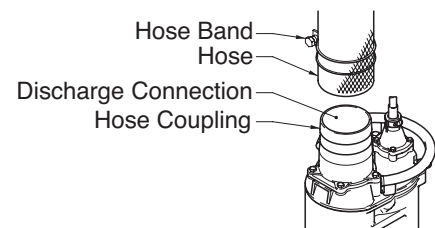
- When installing the pump, pay close attention to its center of gravity and weight. If it is not lowered into place correctly, it may fall and be damaged or cause injury.
- When transporting the pump by hand, be sure to employ manpower commensurate with the weight of the pump. To avoid back injury when lifting the pump, bend the knees to pick it up rather than bending your back only.



CAUTION

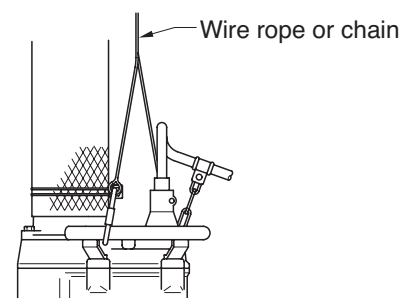
Do not under any circumstances install or move the pump by suspending it from the cabtyre cable. The cable may be damaged, causing electrical leakage, shock, or fire.

- (1) Attach the hose to the hose coupling as far as it will go, then fasten it securely with the hose band.



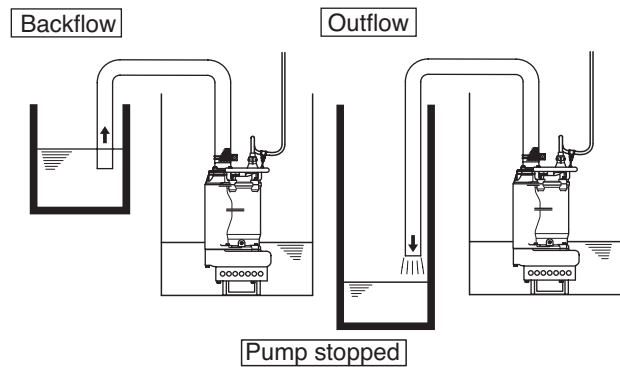
- (2) Avoid dropping the pump or other strong impact. Lift the pump by holding it firmly with the hands or by attaching a rope or chain to the handle.

Note: On Cabtyre cable handling, see below Electrical Wiring.



(3) Install the pump in a location with sufficient water level, where water collects readily.

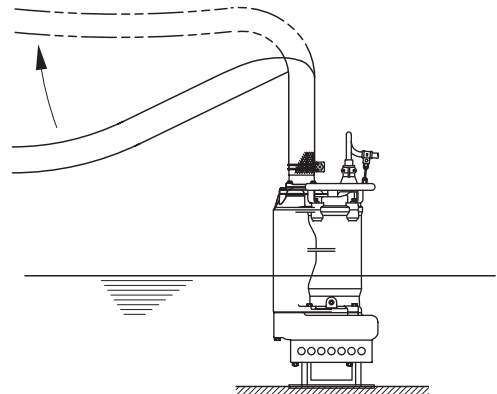
Note: The "Operating water level" chart below shows the water level necessary for operation. The tip of the hose (discharge end) should be located higher than the water surface. If the end of the hose is submerged, water may flow back to the pump when the pump is stopped; and if the hose end is lower than the water surface, water may overflow when the pump is turned off.



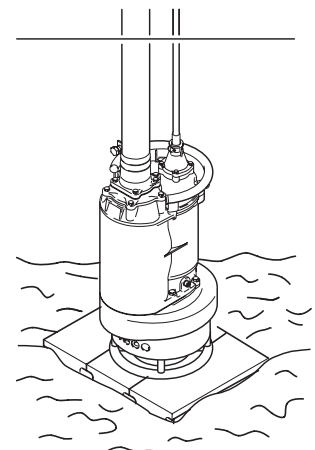
(4) The hose should be run as straight as possible, since excessive bending will hinder the water flow, preventing sufficient lift, and can even cause the hose to become clogged with earth. If the hose is crimped near the pump, air can become trapped in the pump and cause idle running.

CAUTION

- If large quantities of earth are sucked up, damage resulting from friction in the pump can lead to electrical leakage and shock.
- When the pump is installed at a work site, make sure the hose is connected in such a way as to ensure proper drainage. Otherwise water may leak out and cause damage to surrounding walls or flooring, or to equipment.



(5) Use the pump in the upright position. To prevent the pump from becoming submerged in mud, mount it on a block or other firm base if necessary.



■ Using a pipe

- (1) Handle the pump with care not to give excessive shock or drop down. Attach chain or wire rope to the eyebolt to lift or lower the pump.

Note: See *Electrical wiring for handling the cable*.

CAUTION Refrain from dry running, or otherwise the pump may not perform sufficiently, or even cause faults, electrical leak, shocks, or burn-out.

- (2) Install the pump where water level or the flow is enough.

CAUTION Refrain from operating at excessively low head or with excessive obstructions through the strainer stand, or otherwise it may cause vibration, noise, faults, or even electrical leak or shocks.

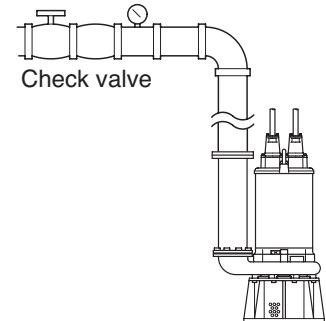
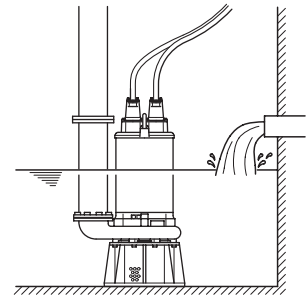
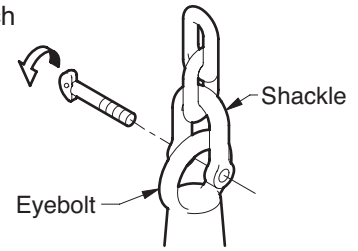
Note: See *Operation water level(p.16)* for the required operating water level.

- (3) Install the piping as straight as possible, and not to give the piping weight on the pump.
- (4) Install the piping so that the pump may withstand a counter reaction at starting.
- (5) See the standard specifications for the flange at piping works, and withstand water pressure.
- (6) Provide check valves along with the piping where the actual head(vertical head) is higher.
- (7) Install the piping so that it may easily be stripped from outside.
- (8) Install the piping so that it may not cause to pool air along with the piping.
- (9) Protect the pump from welding sparks or paints while in piping works.

Note: *The product is not provided with any piping materials, and a proper set of piping materials should be procured at your care. Where the discharge piping end is submerged, the water may flow reversely when the pump is stopped. Where the discharge end level is lower than that of the water level water may continue to discharge when the pump is stopped.*

CAUTION If and when the pump sucks excessive volume of sand and silt, it may cause electrical leak or shocks due to wear around the pump section.

- (10) Operate the pump at upright position. Arrange the position not to bury in sand and silt where it is likely to bury during operation.



5 ELECTRICAL WIRING

▶ Performing electrical wiring

WARNING

- Electrical wiring should be performed by a qualified person in accord with all applicable local regulations. Failure to observe this precaution not only risks breaking the law but is extremely dangerous.
- Incorrect wiring can lead to electrical leakage, electrical shock or fire.
- Absolutely provide a dedicated earth leakage circuit breaker and a thermal overload relay suitable for the pump (available on the market). Failure to follow this warning can cause electrical shock or explosion when the product fails or an electrical leakage occurs.

Operate well within the capacity of the power supply and wiring.

▶ Grounding

WARNING Do not use the pump without first grounding it properly. Failure to ground it can lead to electrical shock from an electrical leak or pump malfunction.

CAUTION Do not attach the grounding wire to a gas pipe, water pipe, lightning arrester or telephone grounding wire. Improper grounding can result in electrical shock.

▀ Cabtyre cable



CAUTION

- If it is necessary to extend the cabtyre cable, use a core size equal to or larger than the original. This is necessary not only for avoiding a performance drop, but to prevent cable overheating which can result in fire, electrical leakage or electrical shock.
- If a cable with cut insulation or other damage is submerged in the water, there is a danger of water seeping into the motor causing a short. This may result in damage to the pump, electrical leakage, electrical shock, or fire.
- Be careful not to let the cabtyre cable be cut or become twisted. This may result in damage to the pump, electrical leakage, electrical shock, or fire.
- If it is necessary to submerge the connection leads of the cabtyre cable in water, first seal the leads completely in a molded protective sleeve, to prevent electrical leakage, electrical shock, or fire.

Do not allow the cabtyre cable leads to become wet.

Make sure the cable does not become excessively bent or twisted, and does not rub against a structure in a way that might damage it.

▀ Connecting the cabtyre cable



WARNING

Before connecting leads to the terminals, make certain the power supply is turned off (circuit breaker, etc.), to avoid electrical shock, shorting, or unexpected starting of the pump, leading to injury.

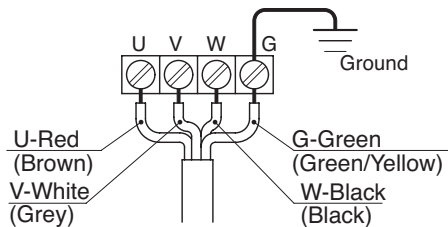


CAUTION

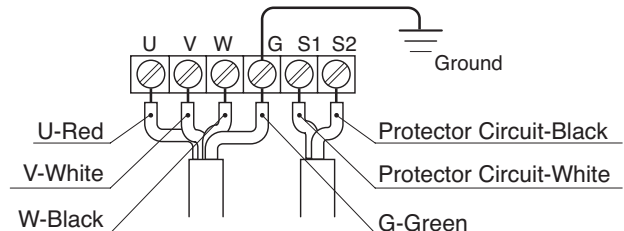
Do not use the pump if the cabtyre cable is worn or damaged, which can result in electric shock, shorting, or fire.

Connect the leads of cabtyre cable to the control panel terminals as shown in the diagram, being careful not to let the leads become twisted together.

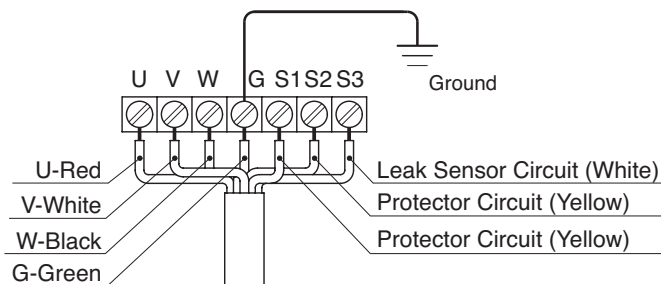
Direct-on-line
KRD, NKZ Series
GPN Series (5.5 ~ 15kW)



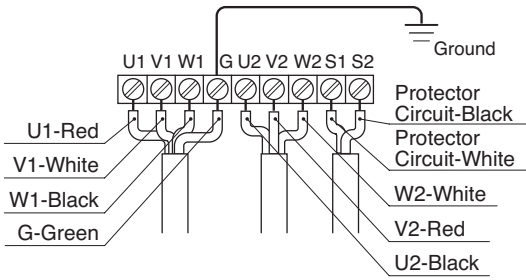
Direct-on-line
GSZL Series (22kW)



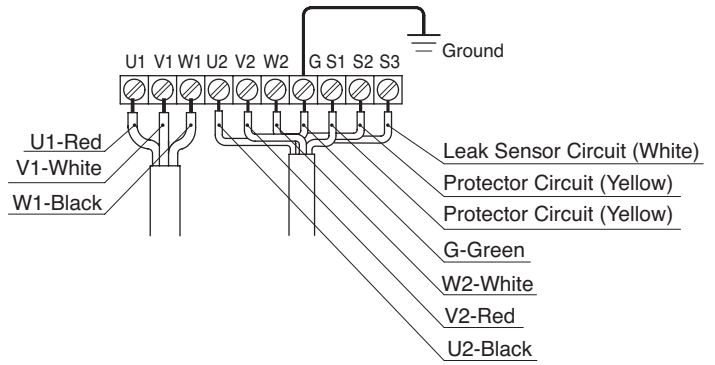
Direct-on-line
GPN Series (22kW, 380 to 600V models)
GSD Series (37kW Option)
GSZ(L) Series (22 ~ 45kW Option)



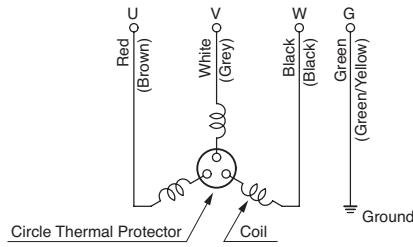
**Star-Delta Start
GSD Series (37kW)
GSZ(L) Series (37kW & 45kW)**



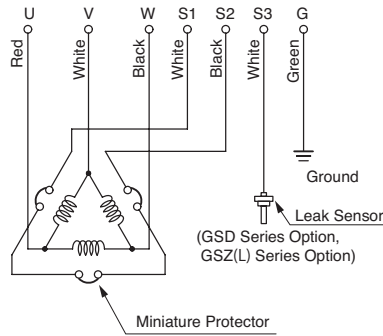
**Star-Delta Start
GSZ(L) Series (150kW or Option)**



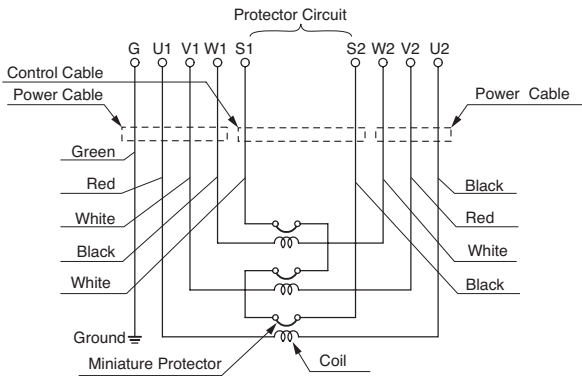
**Direct-on-line start, three-phase motor
(KRD / NKZ Series, GPN Series 5.5 ~ 15kW)**



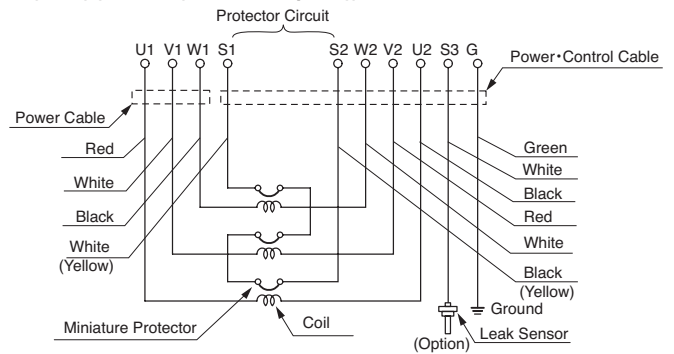
**Direct-on-line start
three-phase motor
(GPN Series 22kW, GSD Series 37kW,
GSZ(L) Series 22 ~ 45kW)**



**Star-Delta Start
three-phase motor
(GSD Series 37kW, GSZ(L) Series 37kW & 45kW)**



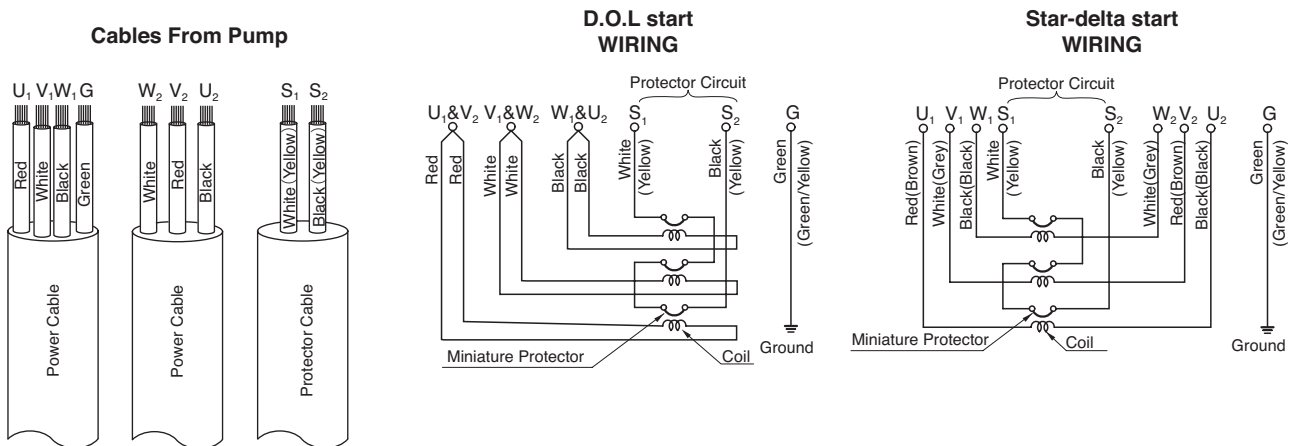
**Star-Delta Start
three-phase motor
(GSZ(L) Series (150kW or Option))**



SPECIAL NOTE FOR D.O.L STARTING

Wiring for models

Applicable to the following models : Models with output of 37kW (50HP) or above



How to connect leads:

Connect lead wires U1 (RED) and V2 (RED) to T1 in the control panel.

Connect lead wires V1 (WHITE) and W2 (WHITE) to T2 in the control panel.

Connect lead wires W1 (BLACK) and U2 (BLACK) to T3 in the control panel.

Connect lead wires S1 and S2 for Miniature Protector Circuit to the corresponding control circuit or control relay.

Note: Failure to connect the Miniature Thermal protection will void the warranty on the unit.



WARNING

All electrical work must be performed by an authorized electrician, in compliance with national and local electrical equipment standards and wiring codes. never allow an unauthorized person to perform electrical work

6 OPERATION

Before starting

- (1) Make sure once again that the product is of the correct voltage and frequency rating.

CAUTION Using the product at other than rated voltage and frequency will not only lower its performance but may damage the product.

Note: Confirm the rated voltage and frequency on the model name plate.

- (2) Confirm the wiring, supply voltage, circuit breaker capacity, and motor insulation resistance.

Reference insulation resistance = 20 MΩ or greater

Note: The reference insulation resistance (20MΩ or greater) is the value when the pump is new or has been repaired. For the reference value after installation, see below at section "7.Maintenance and Inspection "

- (3) The setting on the circuit breaker or other overload protector should be made in accord with the rated currency of the pump.

Note: See the model name plate on the pump for its rated current.

- (4) When powering the pump with a generator, do not share the generator with other equipment.

Test operation

WARNING

- Never operate the pump while it is suspended in the air. The recoil may result in injury or other major accident.
- Never start the pump when people are standing next to it. An electrical leak can result in electrical shock.

- (1) Run the pump for a short time(1~2 seconds) to check the direction of rotation. The rotation is correct if the pump recoil direction is counter-clockwise.

CAUTION Always perform the rotation check in air, not while the pump is submersed. Running the pump in reverse direction while submersed may damage the pump, resulting in electrical leakage or electrical shock.

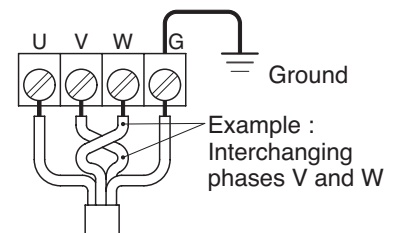
- (2) If the direction is reversed, correct it using the countermeasure shown below.

WARNING Before changing the connections to correct the rotation, be sure to turn off the power supply (circuit breaker), and make sure the impeller has stopped completely, to avoid electrical shock or shorting.

COUNTERMEASURE

(Direct-on-line start models):

Interchange connections between any two of the three leads U, V, or W.



- (3) Run the pump for a short time (3~10minutes) and confirm the following.

Using an ammeter(clamp-on type), measure the operating current at the U, V, and W phase leads on the terminal strip.

COUNTERMEASURE

If the operating current exceeds the rated value, pump motor overload may be a cause. Make sure the pump has been installed under proper conditions as described in the section on Installation.

Using an AC voltmeter(tester), measure voltage at the terminal strip.

■ Power supply voltage tolerance = within $\pm 5\%$ of the rated voltage.

COUNTERMEASURE

If the supply voltage is outside the variation, possible causes are the power supply capacity or an inadequate extension cable. Look again at Electrical Wiring and make sure the conditions are proper.

CAUTION In case of very excessive vibration, unusual noise or odor, turn off the power immediately and consult with your nearest dealer or Tsurumi representative. Continuing to operate the pump under abnormal conditions may result in electrical shock, fire, or electrical leakage.

(4) If the test operation turns up no problems, continue with full operation.

Operation

WARNING

- The pump may become very hot during operation. Be careful not to contact the pump accidentally to avoid being burned.
- To avoid serious injury, do not insert a finger or any other object in the pump inlet holes.
- When the pump is not used for an extended period, be sure to turn off the power (circuit breaker, etc.). Deterioration of the insulation may lead to electrical leakage, electrical shock, or fire.
- In case of a power outage, turn off the power to the pump to avoid having it start unexpectedly when the power is restored, presenting serious danger to people in the vicinity.

Pay careful attention to the water level while the pump is operating. Dry operation may cause the pump to malfunction.

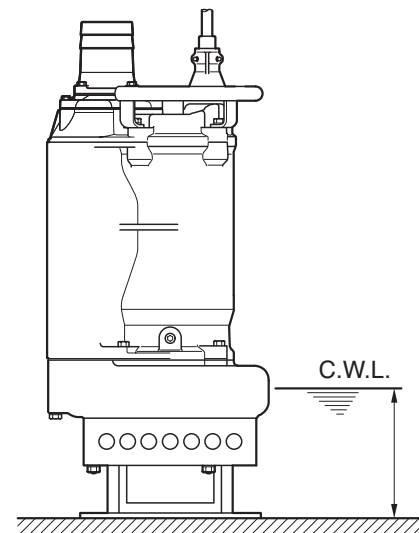
Note: See below, "Operating water level" for the water level necessary for operation.

Operation water level

CAUTION Do not operate the pump below the C.W.L. (Continuous Running Water Level). Failure to observe this condition may result in damage to the pump, electrical leakage or electrical shock.

The table shows the C.W.L. for different output classes. Be careful not to allow the water level to drop below the applicable limit.

Model	C.W.L. (mm)	Model	C.W.L. (mm)
KRD35.5	265	GPN422	300
KRD47.5	270	GPN622	300
KRD611	270	GSD837	480
NKZ32.2	225	GSZ637	440
NKZ33.7	225	GSZ837	480
NKZ43.7	225	GSZ845	460
NKZ35.5	220	GSZL822	350
NKZ45.5	220	GSZL837	370
NKZ411	240	GSZ10150	780
NKZ611	240		
GPN35.5	270		
GPN411	295		
GPN415	295		



Motor protection system



WARNING During inspections or repairs, always be sure to turn off the power. Sudden unexpected starting of the pump can cause electrical shock, shorting, or serious injury.



CAUTION

- Always determine the cause of the problem and resolve it before resuming operation. Simply repeating cycles of stopping and restarting will end up damaging the pump.
- Do not continue operation at very low water level, or while the strainer stand is clogged with debris. Not only will performance suffer, but such conditions may cause noise, heavy vibration, and malfunctioning.

1. Circle Thermal Protector

If a current overload or overheating occurs under the symptoms given below, the motor will stop automatically to protect the motor regardless of the water level at the time of operation.

In this type of motor protector, the motor will automatically restart after cooling down. If the motor is stopped by protector tripping, turn off the power supply first, and disconnect the cables from the power terminals. After this, make sure to eliminate the cause of the problem, such as the following:

- Extreme fluctuation of power supply voltage
- Pump operated under overload condition
- Pump operated at open phase or binding condition



WARNING If repair or maintenance is attempted with cables connected to power supply, unintended automatic restarting of the motor may cause human injury.

2. Miniature Protector

This protector is embedded inside the motor coil. If the coil should overheat for any reason, bending of the bimetal of the miniature protector triggers a signal, which in turn causes a dedicated circuit in the starting console or control panel to be furnished by the user to shut off the motor current. When the temperature returns to normal, the protector is automatically reset, but restarting is controlled from the starting console or control panel.

Note: *A b-contact miniature protector is adopted, which is normally "closed" and goes to "open" upon overheating. To protect the motor from current surges, be sure to install a motor breaker thermal relay or similar device in the external starting console or control panel. A 3E relay is able to protect the motor from overload, open-phase or reverse-phase operation.*

3. Leak Sensor (Electrode)

If water leaks into the oil chamber due to wear of the mechanical seal, the water leak probe sends a signal to the dedicated circuit (prepared by the user) in the external starting panel or control panel and triggers a display, warning, and stops the pump to prevent the water from leaking into the motor.

Note: *Always determine the cause of the problem and resolve it before resuming operation. Simply repeating cycles of stopping and restarting will end up damaging the pump. Do not continue operation at very low lift, low water level, or while the Impeller is clogged with debris. Not only will performance suffer, but such conditions may cause noise, heavy vibration, and malfunctioning.*

7 MAINTENANCE AND INSPECTION

Regular maintenance and inspections are a necessity for continued efficient functioning of the pump. If any abnormal conditions are noticed, refer to the section "9.Troubleshooting" and take corrective measures immediately. It is recommended that a spare pump be kept ready in case of any problems.

Cable label replacement

Be sure to replace the warning label of the cable with the new one after repairing or changing the cable. If you do not have a new warning label for the replacement, contact the Tsurumi pump dealer nearby your place.

Prior to inspection

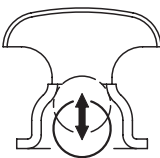


WARNING Detach the cable from the receptacle or terminals, after making certain the power supply (circuit breaker, etc.) is turned off. Failure to follow this precaution may result in a serious accident from electrical shock or unexpected starting of the pump motor.

- (1) Washing the pump
Remove accumulated matter from the surface of the pump and wash it with clean water. Take special care to remove any debris from the impeller.
- (2) Inspecting the pump exterior
Look for any peeling or chipped paint, and make sure the nuts and bolts are fastened tightly. Any cracks in the surface should be repaired by cleaning that area, drying it and then applying a touchup coating.

Note: *Touchup is not supplied. Note that some kinds of damage or looseness may require that the unit be disassembled for repairs. Please consult with your nearest dealer or Tsurumi representative.*

Regular Inspection

Interval	Inspection Items
Daily	<ul style="list-style-type: none"> ■ Measuring the operating current ● To be below the rated current ■ Measuring the power voltage ● Power supply voltage tolerance = within $\pm 5\%$ of the rated voltage
Monthly	<ul style="list-style-type: none"> ■ Measure insulation resistance ● Reference insulation resistance = 1MΩ or greater <i>Note: If the insulation resistance has become notably lower than the previous inspection, an inspection of the motor will be necessary.</i> ■ Pump inspection ● A noticeable drop in performance may indicate wear in the impeller or else clogging of the strainer stand, etc. Remove the clogged debris, and replace the parts if worn. ■ Air release valve operation check ● Make sure the air release valve (for preventing air locks) operates properly when the unit is started. 
Half-yearly	<ul style="list-style-type: none"> ■ Oil inspection ● Check the oil every six months or after 2,000 hours of use, whichever comes first. ● Check the oil every six months or after 3,000 hours of use, whichever comes first. (GSZ) ■ Inspection of lifting chain or rope ● Replace if damage, corrosion, or wear has occurred to the wire rope or the chain. Remove if foreign object is attaching to it.
Yearly	<ul style="list-style-type: none"> ■ Change oil ● Change the oil every 12 months or after 4,000 hours of use, whichever comes first. ● Change the oil every 12 months or after 6,000 hours of use, whichever comes first. (GSZ) ■ Designated oil : Turbine Oil VG32 <i>Note: See below for details of oil inspection and oil change.</i> ■ Change mechanical seal <i>Note: Specialized know-how is required for inspecting and replacing the mechanical seal. Consult with your nearest dealer or Tsurumi representative.</i>
Every 2 to 5 years	<ul style="list-style-type: none"> ■ Overhaul ● This should be carried out even if there are no problems with the pump. The frequency depends on how continuously the pump is in use. <i>Note: To overhaul the pump, contact the dealer where it was purchased, or the Tsurumi sales office in your area.</i>

Storage

When the pump is out of use for an extended period, wash it and dry it thoroughly, then store it indoors.

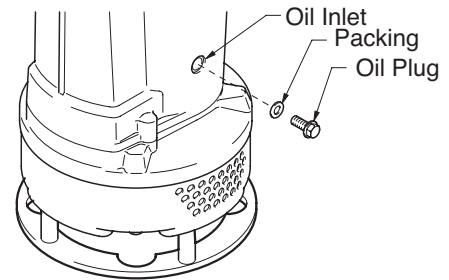
Note: *Always run a test operation before putting the pump back into service.*

When the pump is left installed in water, it should be run at regular intervals (about once a week).

Oil inspection and Oil change



WARNING When the pump is tilted for inspecting or changing the oil, pay careful attention to the center of gravity and weight of the pump. When lowering the pump, fasten the wire rope or the chain to the eyebolts provided for this purpose. Failing to lower the pump completely may result in damage or injury if the pump is dropped.



Inspecting Oil

Remove the oil plug and tilt the pump to drain a small amount of oil. If the oil is milky white or has water mixed in with it, the mechanical seal may be faulty. In this case the pump will need to be disassembled and repaired.

Replacing Oil

Remove the oil plug and drain all the oil, then replace it with the specified amount.

Specified Oil : Turbine Oil VG32 (non-additive) Unit : ml

Applicable Model	Specified Volume	Applicable Model	Specified Volume
KRD35.5	1850	GPN411	2500
KRD47.5	2300	GPN415	2500
KRD611	2300	GPN422	3600
NKZ32.2	700	GPN622	3600
NKZ33.7	700	GSD837	8400
NKZ43.7	700	GSZ637	8400
NKZ35.5	1200	GSZ837	8400
NKZ45.5	1100	GSZ845	8000
NKZ411	2500	GSZL822	5400
NKZ611	2500	GSZL837	9200
GPN35.5	1100	GSZ10150	26000

Note: *Worn oil and other waste products should be disposed of by a qualified agent, in accord with applicable local laws. The oil plug packing and O-ring should be replaced each time the oil is inspected or changed.*

Replacement Parts

The table lists the parts that need to be replaced periodically. Replace these using the recommended frequency as a guideline.

Part	Replacement Frequency
Mechanical Seal	When oil is discolored.
Lubricant ; Turbine Oil VG32 (non-additive)	See Regular Inspection on P.19
Packing, O-Ring	Each time pump is disassembled or inspected.
Oil Seal or V-Ring	When ring is worn, and each time pump is disassembled or inspected
Shaft Sleeve	When it becomes worn
Labyrinth Ring (GSD, GSZ(L))	When it becomes worn

Refilling bearing grease

The GSZ10150 use angular contact bearings.

If maintenance is required due to noise, etc., disassemble the motor and refill the bearings with grease.

- Please use grease conforming to the composition table below.

Model	Initial Amount	
	Upper	Lower
GSZ10150	200g	450g

Item	
Soap Type	Lithium
Base Oil Type	Naphthenic oil
Temperature Range	-20 to 180°C
Penetration grade	3

8 DISASSEMBLY AND REASSEMBLY

WARNING

- **Before disassembling the pump, first detach the Cabtyre Cable from the receptacle, after making certain the power supply (circuit breaker, etc.) is turned off. To avoid electrical shock, do not work with wet hands. Never check the operation of any parts (impeller rotation, etc.) by turning on the power while the unit is partially assembled. Failure to observe these precautions may result in serious accident.**
- **Do not disassemble or repair any parts other than those designated here. If repairs are necessary in any other than the designated parts, consult with your nearest dealer or Tsurumi representative. Improper repairs can result in electrical leakage, electrical shock, fire, or water leaks.**
- **After reassembly, always perform a test operation before resuming use of the pump. Improper assembly will cause the pump to malfunction, resulting in electrical shock or water leaks.**

The procedure for disassembly and reassembly is shown here to the extent necessary for impeller replacement. A specialized environment and facilities are necessary for work in the mechanical seal and motor parts. Contact your nearest dealer or Tsurumi representative in the event such repairs are necessary.

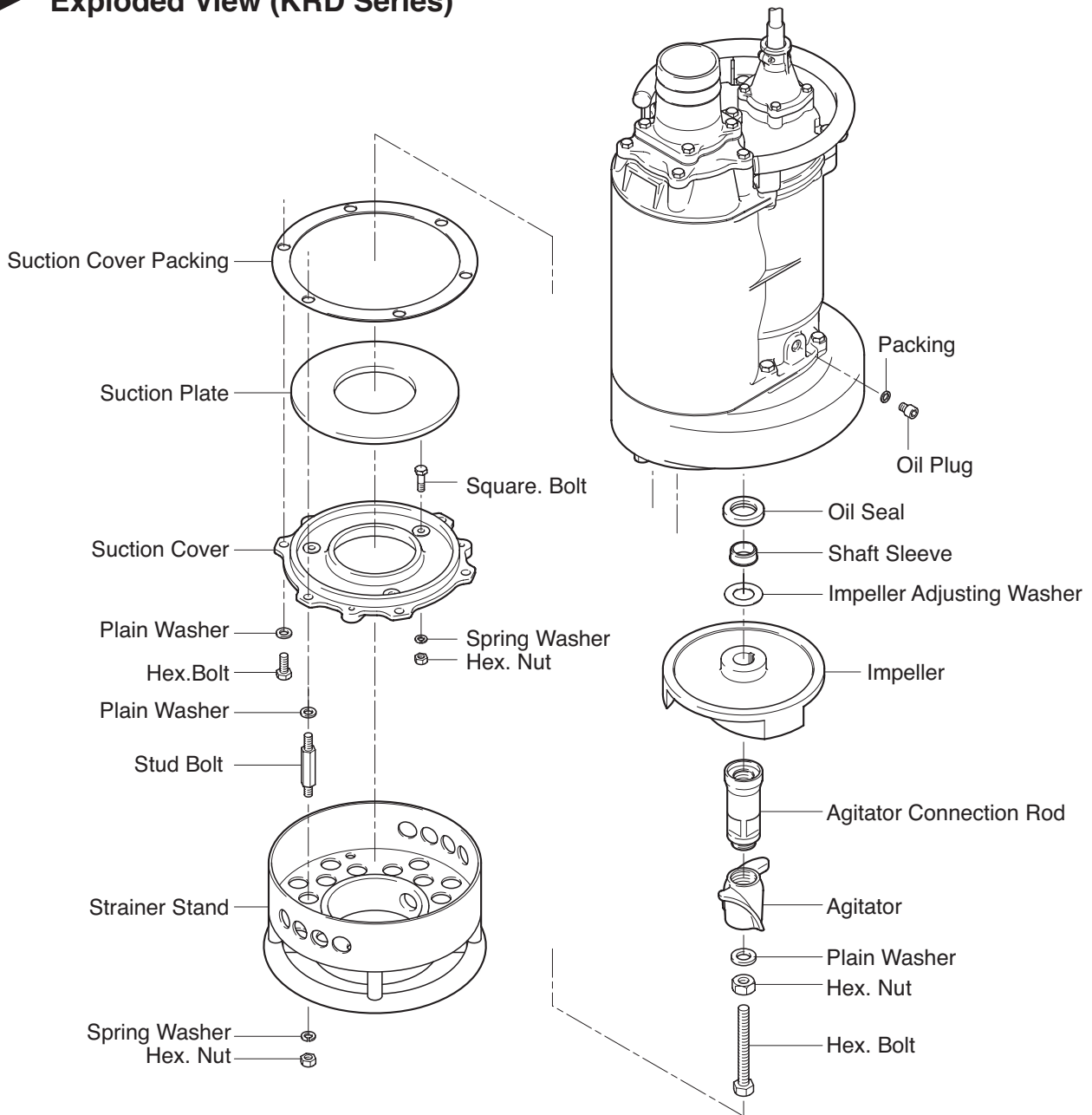
Disassembly (KRD Series)

Note: Remove the oil prior to disassembly.

CAUTION A worn impeller may have sharp edges that can cause injury, and should be handled with care.

- (1) Remove the strainer stand.
Remove the hex. nuts and spring washers under the strainer stand, then detach the strainer stand from the pump.
- (2) Remove the suction cover.
Remove the hex. bolts, plain washers and stud bolts, then remove the suction cover, suction plate and packing from the pump casing.
- (3) Remove the agitator and impeller.
With a box wrench or the like, remove the hex. bolt, hex. nut and plain washer, remove the agitator from its connection rod, then remove the impeller, impeller adjusting washer and shaft sleeve from the shaft.

Exploded View (KRD Series)



Note: The above exploded view is for model KRD47.5. Other models may differ slightly in shape and construction.

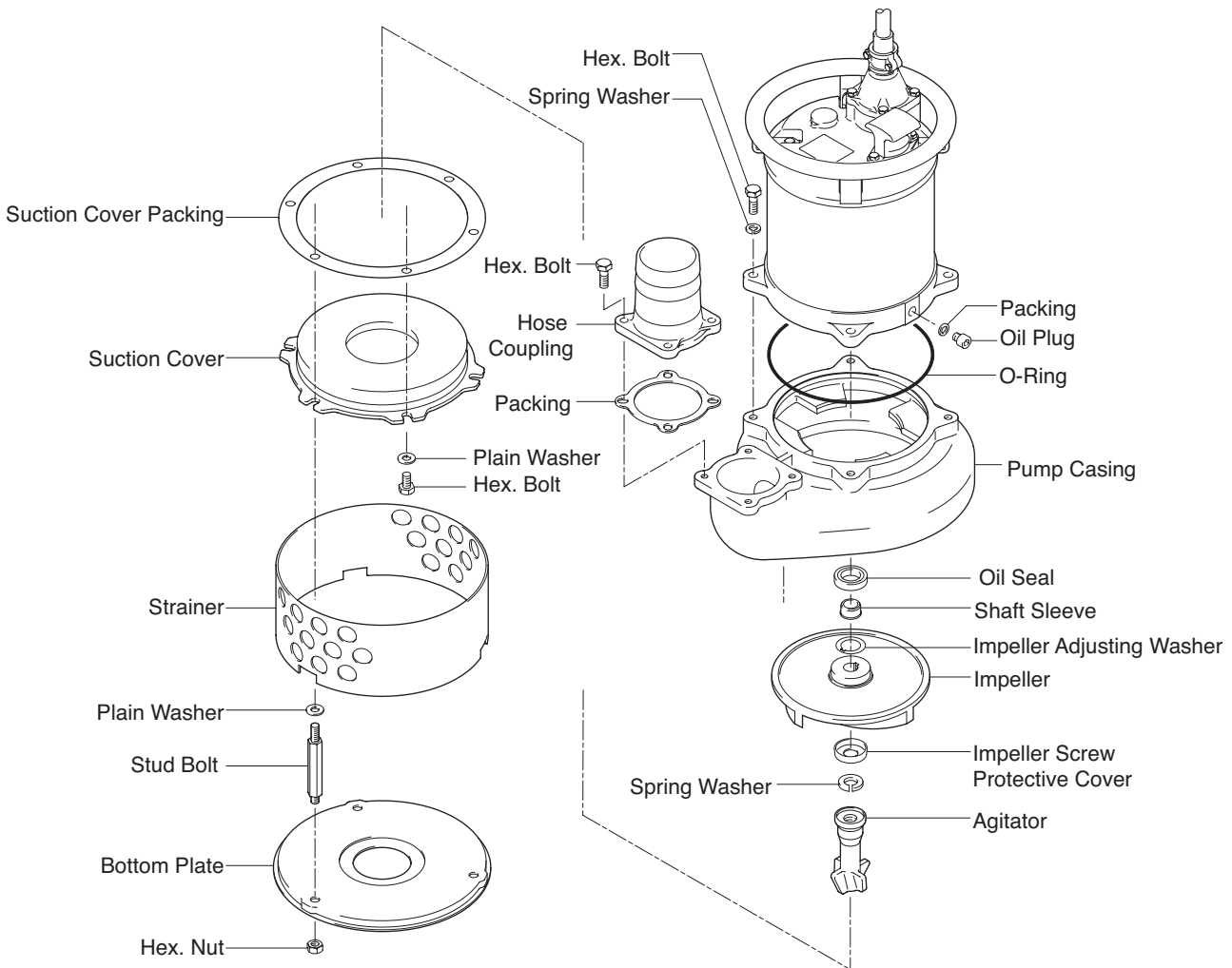
Disassembly (NKZ Series)

Note: Remove the oil prior to disassembly.

- (1) Remove the bottom plate and strainer.
Remove the hex. nuts then remove the bottom plate from the strainer. Next remove the stud bolts and plain washers, then remove the strainer from the suction cover.
- (2) Remove the suction cover.
Remove the hex. bolts, plain washers, then remove the suction cover, packing from the pump casing.
- (3) Remove the impeller.
With a spanner or other tool, remove the agitator and spring washer, then remove the impeller screw protective cover, impeller and shaft sleeve from the shaft.

CAUTION When removing the agitator, do not strike it with a hammer or the like, which can damage it.

Exploded View (NKZ Series)



Note: The above exploded view is for model NKZ43.7. Other models may differ slightly in shape and construction.

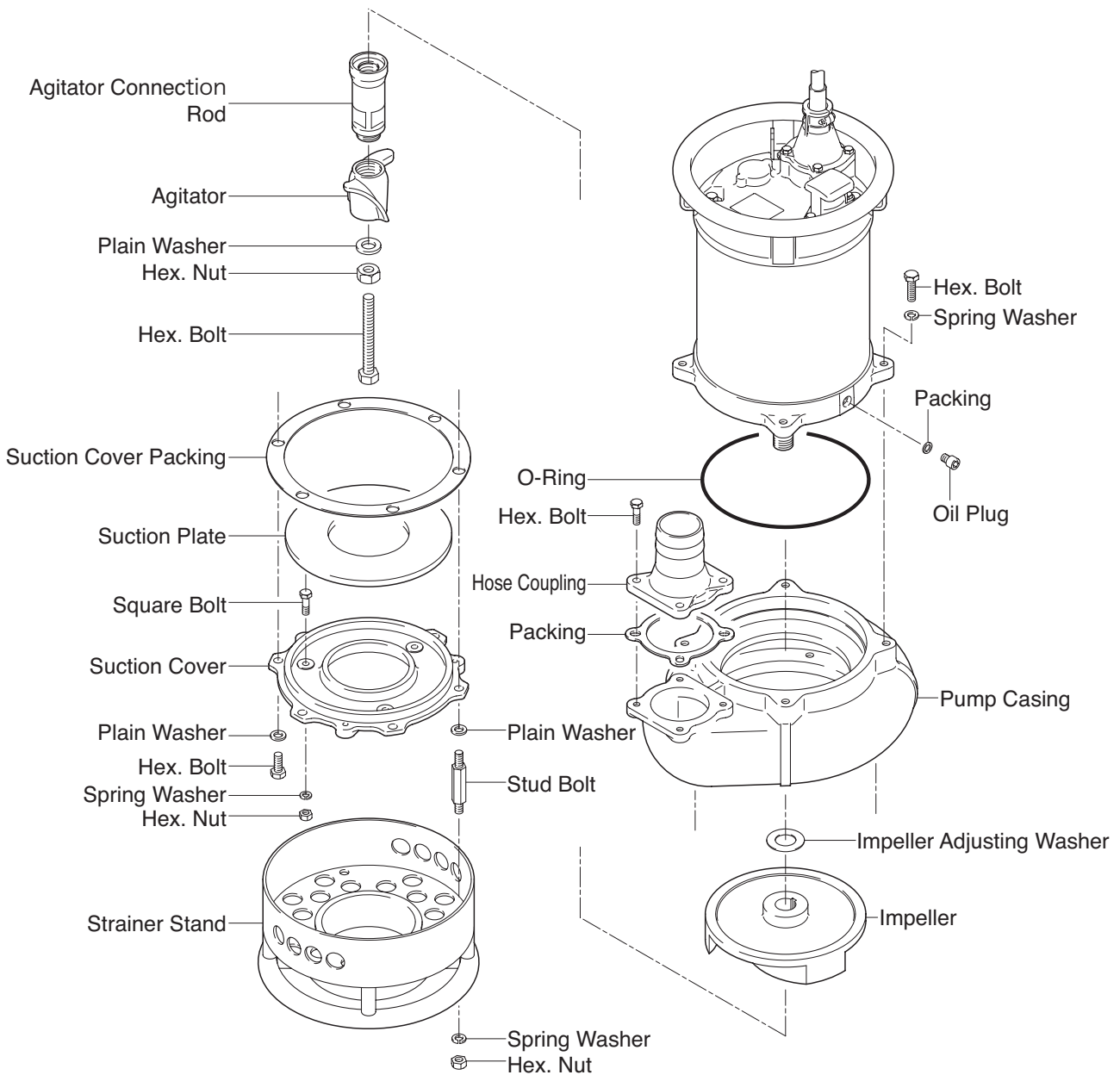
Disassembly (GPN Series)

Note: Remove the oil prior to disassembly.

- (1) Remove the strainer stand.
Remove the hex. nuts and spring washers under the strainer stand, then detach the strainer stand from pump.
- (2) Remove the suction cover.
Remove the hex. bolts, plain washers and stud bolts, then remove the suction cover, suction plate and packing from the pump casing.
- (3) Remove the stirrer and impeller.
With a box wrench or the like, remove the hex. bolt, hex. nut and plain washer, then remove the agitator, its connecting rod, the impeller and impeller adjusting washer.

CAUTION When removing the agitator, do not strike it with a hammer or the like, which can damage it.

Exploded View (GPN Series)



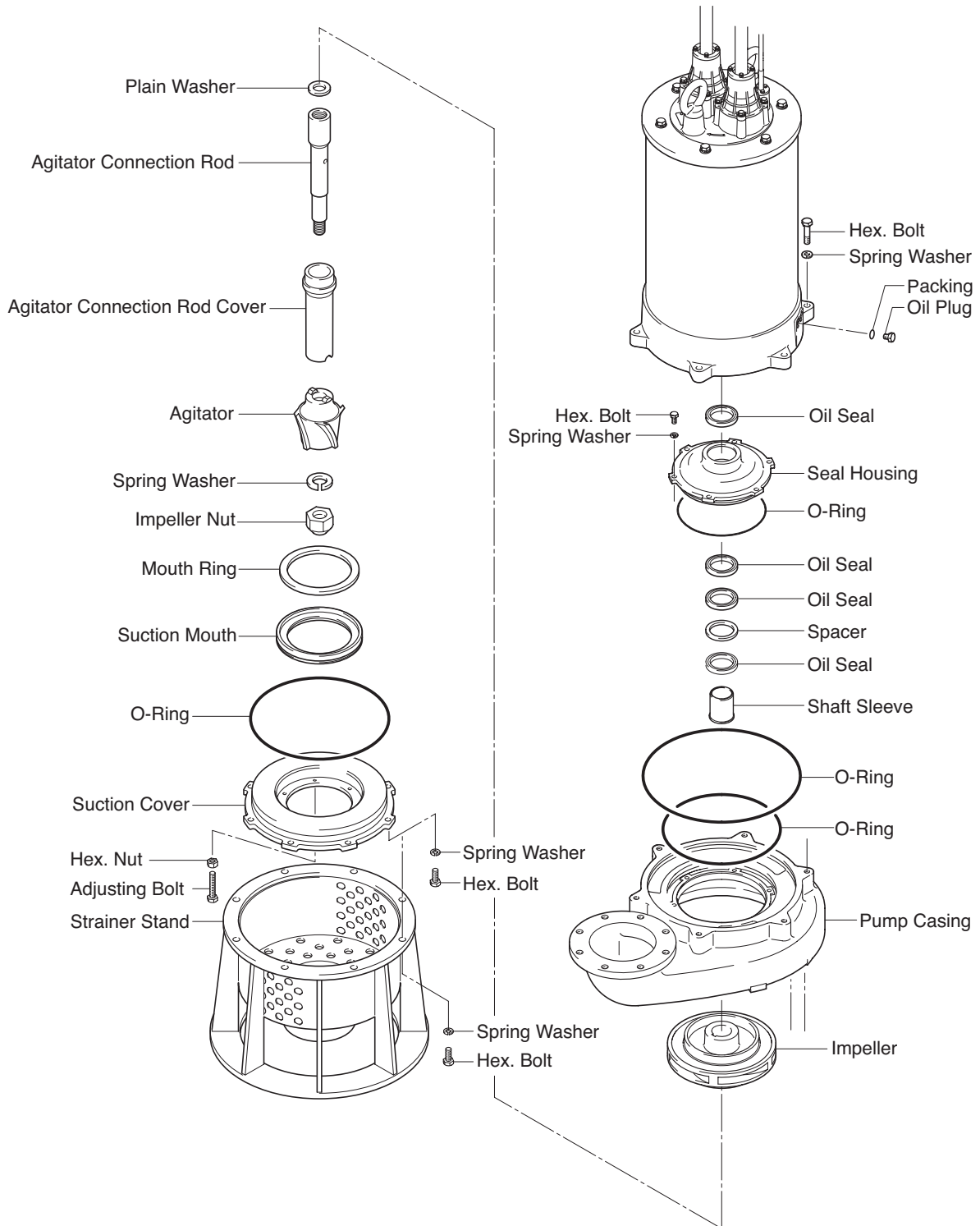
Note: The above exploded view is for model GPN35.5. Other models may differ slightly in shape and construction.

Disassembly (GSD Series)

Note: Remove the oil prior to disassembly.

- (1) Remove the strainer stand, suction cover, mouth ring and suction mouth.
Remove the hex. bolts and spring washers, and remove the strainer stand from the pump. Next, remove the hex. bolts and spring washers, then remove the suction cover, mouth ring, suction mouth and O-ring from the pump casing.
- (2) Remove the impeller.
With a box wrench or other tool, remove the impeller nut, spring washer, agitator, agitator connection rod cover, agitator connection rod and plain washer, then remove the impeller from the shaft.

Exploded View (GSD Series)



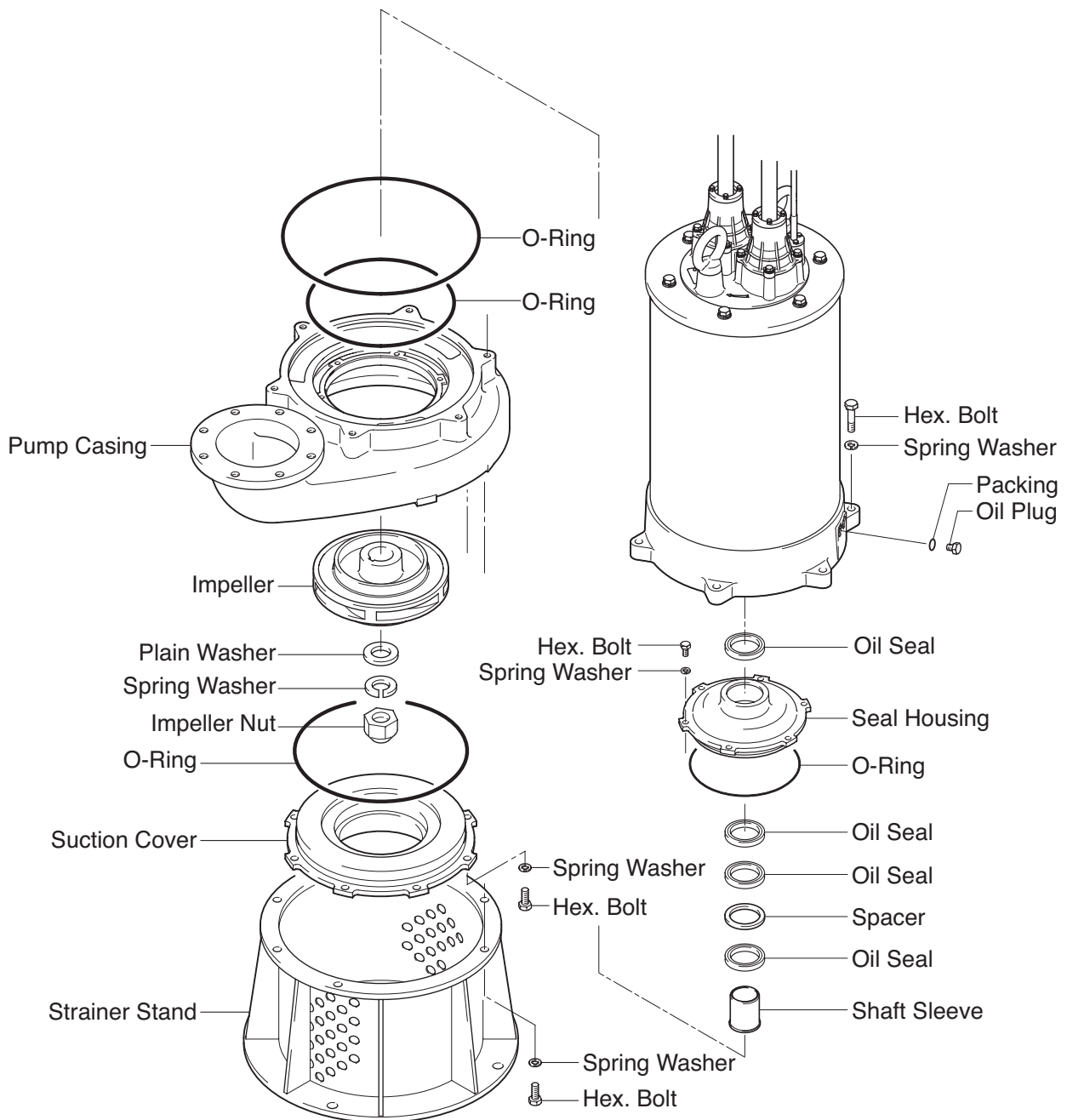
Note: The above exploded view is for model GSD837. Other models may differ slightly in shape and construction.

Disassembly (GSZ Series)

Note: Remove the oil prior to disassembly.

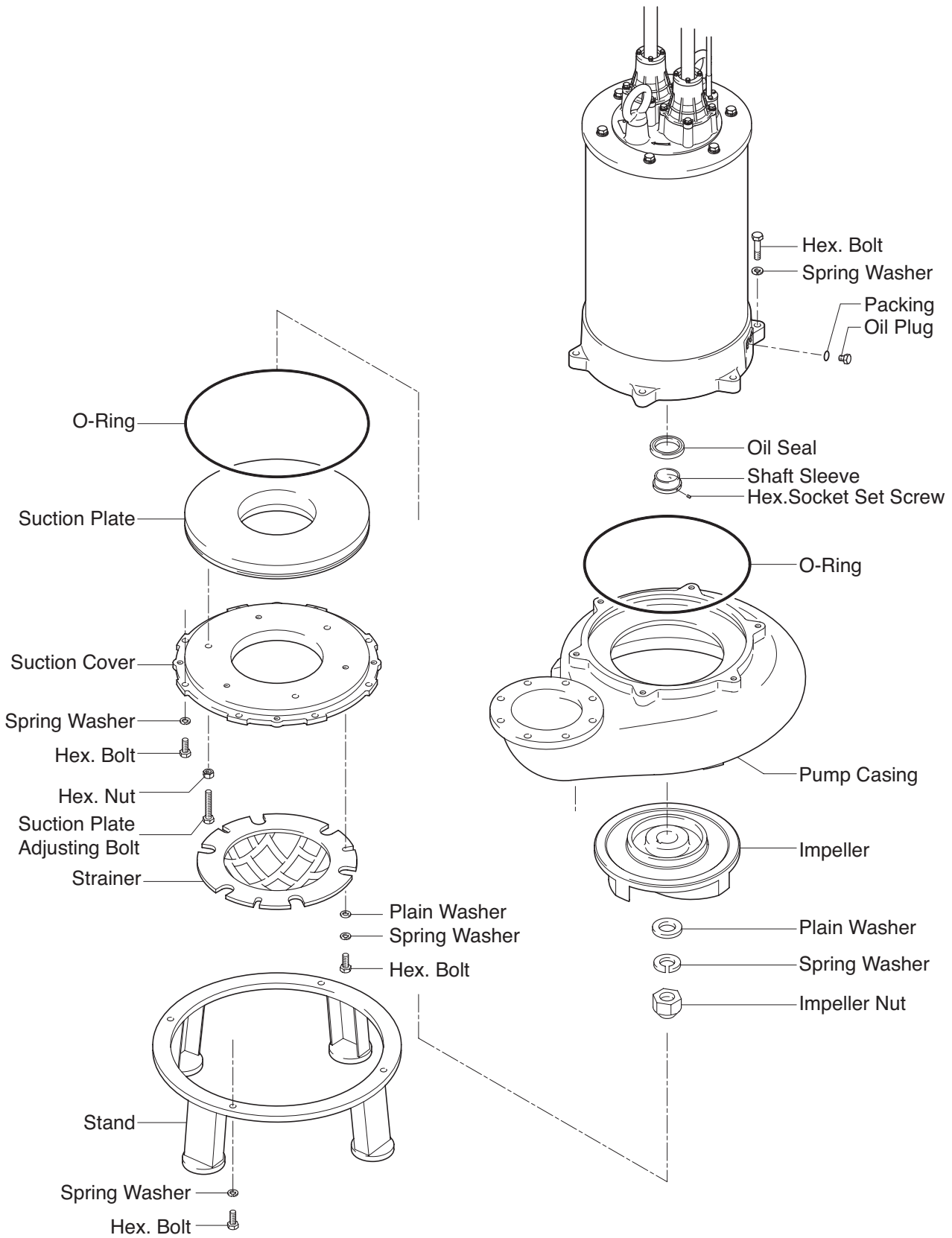
- (1) Remove the strainer stand and suction cover.
Remove the hex. bolts and spring washers, and remove the strainer stand from the pump. Next, remove the hex. bolts and spring washers, then remove the suction cover and O-ring from the pump casing.
- (2) Remove the impeller.
With a box wrench or other tool, remove the impeller nut, spring washer and plain washer, then remove the impeller from the shaft.

Exploded View (GSZ Series)



Note: The above exploded view is for model GSZ837. Other models may differ slightly in shape and construction.

Disassembly (GSZL Series)



Note: The above exploded view is for model GSZL837. Other models may differ slightly in shape and construction.

Reassembly

Reassembly can be performed by reversing the steps for disassembly, paying attention to the following precautions.

Note: *After assembling the pump, do not forget to fill it with oil up to the required amount. Replace the packing and O-ring each time this operation is performed. Replace any other worn or damaged parts as well.*

After attaching the impeller, and again after completing assembly, check to make sure the impeller rotates smoothly.

Impeller gap adjustment (models other than GSZ Series)

If the impeller, suction cover, and/or suction plate are replaced, check the gap between the impeller and the suction cover (suction plate) by using a feeler gauge, then adjust the gap with the following procedure.

- KRD Series, NKZ Series, and GPN35.5 / 411 / 415

If the measured gap is not within the specified gap on the list below, adjust it by changing the quantity and thickness of the suction cover packings and/or the impeller shims (inserted between the impeller and the shaft sleeve).

- KRD422 / 622, GSD Series, and GSZL Series

If the measured gap is not in the specified gap on the below list, adjust it with the following procedure. (Refer to the drawings.)

- 1) Loosen enough all 6 nuts which are inserted to the 6 adjusting bolts (3 for push and other 3 for pull) of the suction plate.
- 2) By changing the screwed depth equally of the 3 adjusting bolts for push (screwed to the through threaded holes on the suction cover), adjust the gap between the impeller and the suction plate.
- 3) Screw-in fully the 3 adjusting bolts for pull to the threaded holes on the suction plate, then tighten the 3 nuts on there to fix the suction cover and the suction plate.
In the case of GPN422 / 622, tighten the 3 nuts on the adjusting bolts for pull (their bolt head are inserted to the suction plate) to fix the suction cover and the suction plate.
- 4) Screw-in fully the 3 adjusting bolts for push to the through-threaded holes on the suction cover, then tighten the 3 nuts on there to prevent loosening.

Applicable Model	Specified Gap		Applicable Model	Specified Gap	
	mm	inch		mm	inch
KRD35.5	0.9~1.4	0.035~0.055	GPN422	0.7~1.2	0.028~0.047
KRD47.5			GPN622		
KRD611			GSD837	1.0~1.5	0.039~0.059
NKZ32.2	0.4~0.9	0.015~0.035	GSZL822	3.5~4.0	0.138~0.157
NKZ33.7			GSZL837	6.5~7.0	0.256~0.276
NKZ43.7			GSZ10150	0.9~1.4	0.035~0.055
NKZ35.5	0.9~1.4	0.035~0.055			
NKZ45.5					
NKZ411					
NKZ611					
GPN35.5	1.4~1.9	0.055~0.074			
GPN411					
GPN415					

The above values are specified in measuring while the motor is turned upside down.

9 TROUBLESHOOTING

⚠ WARNING Always turn off the power before inspecting the pump. Failure to observe this precaution can result in serious accident.

Before ordering repairs, carefully read through this instruction manual, then repeat the inspection. If the problem remains, contact your nearest dealer or Tsurumi representative.

Problem	Possible Causes	Countermeasure
Pump will not start	(1)Power is off. (2)Cable is cut or connected properly. (3)Impeller is clogged.	(1)Turn power on (2)Repair/replace the cable or fix the connection. (3)Inspect the pump and remove any debris.
Pump stops soon after starting (Motor protector operates)	(1) Impeller is clogged. (2)Low voltage. (3)Wrong power frequency. (4)Extended operation with a clogged strainer stand. (5)Faulty motor (burning, water infiltration, etc.).	(1)Remove debris. (2)Provide the rated voltage, or make sure the power cable extension is the proper standard. (3)Check the name plate, and replace the pump. (4)Remove debris from the strainer stand. (5)Repair or replace the motor.
Pool life or Discharge capacity	(1)Worn out impeller. (2)Sharply bent or clogged hose. (3)Motor direction is reversed. (4)Wrong power frequency.	(1)Replace the worn impeller. (2)Straighten out any sharp bends. Enclose the pump with a screen to keep away debris. (3)Interchange power supply leads (P.15). (4)Check the name plate, and replace the pump.
Heavy vibration or noise	(1)Damaged motor bearing.	(1>Contact dealer and replace motor bearing.

Disposal Product

Properly dispose of the product by disassembling it, presorting the contents, and sending them to the waste material treatment site.

The following information is required when ordering repairs or making other inquiries.

Product model	
Manufacturing number	
Purchase date	
Remarks	