

Installation, Operation and Maintenance Manual

6KSW2046(150KSW1546)

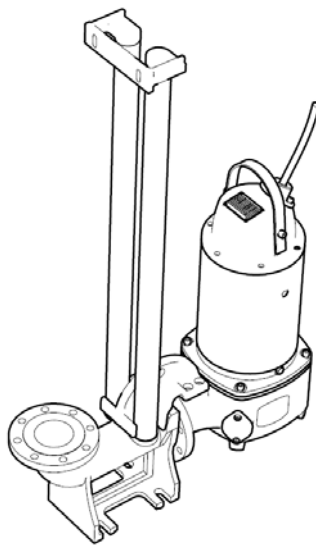


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**Errors and omissions expected. Subject to change without notice. State: 2013.12.30*

1. Introduction

About This Manual

- The K-Hydro pump has been developed in accordance with the latest technology. It was manufactured with great care and is subjected to constant quality control. This manual is designed to help you achieve the best results from our products in terms of longevity, efficient usage and maintenance. All users should read and be familiar with the contents of this manual. All faults resulting from failure to install or maintain our product as described in this manual will be deemed to be faults arising from misuse of the product not covered by warranty. This manual does not take into account any local regulations which have to be complied with by the operator or by any hired installation staff. This pump must never be operated outside the limits laid down in the technical documentation with regard to pumped media, rate of flow, speed, density, pressure and temperature, including motor rating or contrary to any other instructions stipulated in the manual.
- The nameplate states the most important data about this pump which must be stated when making inquiries and especially when ordering spare parts.
- For any clarification required regarding the contents of this manual, please contact K-Hydro headquarter.



Personal Skill & Training

This manual contains important information and hazard/danger warnings. It is imperative to read the instructions set out in the manual prior to installation, making electrical connections and commissioning.

Operators, as well as service, inspection and assembly personnel must have proof of having the appropriate skills to carry out such work. Area of responsibility, allocation and supervision of the personnel must be controlled by the operator. Should the personnel not have the required knowledge, training must be arranged. If required, the operator can arrange such training to be carried out by the manufacturer/supplier. The operator must also ensure that the instruction manual is fully understood by the personnel.

Product Warranty:
Coverage

K-Hydro undertakes to remedy faults in products under these conditions:

- The faults are due to defects in design, materials or workmanship.
- The faults are reported to an K-Hydro Representative within warranty period.
- The products is used only under the condition described in this manual.
- The monitoring equipment incorporated in the product is correctly connected and in use.
- All service and repair work is done by K-Hydro-authorized personnel.
- Genuine K-Hydro parts are used.
- Only explosion-proof-approved spare parts and accessories authorized by K-Hydro are used in explosion-proof products.

Product Warranty:
Limitation

The Warranty does not cover faults caused by these situations:

- Deficient maintenance
- Improper installation
- Modifications or changes to the product and installation made without consulting K-Hydro
- Incorrectly executed repair work
- Normal wear and tear

K-Hydro assumes no liability for these situations:

- Bodily injuries
- Material damages
- Economic losses

Product Warranty:
Claim

K-Hydro products are high-quality products with expected reliable operation and long life. However, should the need arise for a warranty claim, then contact your K-Hydro's representative.

Spare Parts

K-Hydro guarantees that spare parts will be available for 10 years after the manufacture of this product has been discontinued.

2. Safety

Safety Message Level

Danger: A hazardous situation which, if not avoided, will result in death or serious injury



Warning: A hazardous situation which, if not avoided, could result in death or serious injury.



Caution: A hazardous situation which, if not avoided, could result in minor or moderate injury.



Electrical Hazard: The possibility of electrical risks if instructions are not followed in a proper manner.



Notice: A potential situation which, if not avoided, could result in an undesirable result or state. Practice not related to personal injury





This pump contains hazardous moving parts. The operator should be aware of safety precautions to prevent physical injury.

- Operating, installing, or maintaining the pump in any way that is not covered in this manual could cause death, serious personal injury, or damage to the equipment. This includes any modification to the equipment or use of parts not provided by K-Hydro. If there is a question regarding the intended use of the equipment, please contact an K-Hydro's representative before proceeding.

- To prevent risk of injury, disconnect power before servicing.

- Never put fingers near impeller when pump is connected to a power source.

- Installation should be performed by technicians with the appropriate qualifications as required by local legislation.

- This pump has not been approved for use in swimming pools and it should not be installed in this type of application.

- Do not work alone. Use proper safety equipment including antiseptic masks if necessary.

- Ensure that there is no toxic or explosive gas in the wet well before entering or welding or using electric tools.

- Use approved lifting equipment and slings and do not stand under the pump while it is being lifted.

- The cable is not designed to lift the pump and the pump must not be maneuvered by use of the cable.

- Ensure the cable particularly the exposed end is kept dry during installation.

- The use of an earth leakage circuit breaker is highly recommended and may be mandatory under local regulations. Please check local requirements.

- Never operate the pump with the discharge valve closed.

- Any pressure-containing devices explode, rupture, or discharge its contents if they are over-pressurized. Take all necessary measures to avoid over-pressure.

- Do not change the service application without the approval of an authorized K-Hydro's representative.



NOTICE

For information about how to transport and store the pump safely, see Handling and Storage in this manual.

User Health and Safety

The product is designed for use in liquids that can be hazardous to health. Observe these rules when working with the product:

- Make sure that all personnel who work with sewage systems are vaccinated against diseases to which they may be exposed.
 - Observe strict personal cleanliness
-

Safety Equipment

Use safety equipment according to the related regulations. Prerequisite equipment includes following products:

- Helmet
 - Safety Goggle (with side shields)
 - Protective Shoes
 - Protective Gloves
 - Gas Mask
 - Hearing Protection
-

NOTICE

The noise level of the product is lower than 75dB. However, the noise level of 75dB may be exceeded in some installations and at certain operating points on the performance curve. Make sure that you understand the noise level requirement in the environment where the pump is installed. Failure to do so may result in hearing loss or violation of local laws.

The Work Area

Observe these regulations and warnings in the work area

- Always keep clean the work area
 - Pay attention to the risks presented by gas and vapors in the work area.
 - Avoid all electrical dangers. Pay attention to the risks of electric shock or arc flash hazards.
-

Product and Product

Positioning

Requirements

Observe these requirements for the product and the product positioning

- Vent the tank of a sewage station in accordance with local plumbing codes.
 - Never operate a pump unless safety devices are installed.
-

Electric Connection

Regulations

Electrical connections must be made by certified electricians in compliance with all international, national, state, and local regulations. Observe these guidelines and warnings for electrical connections.

- Make sure that the product is isolated from the power supply and cannot be energized by mistake. This guideline also applies to the control circuit.
 - Make sure that the thermal protector are connected to a protection circuit according to the product approvals, and that they are use.
 - Make sure that the cable and the cable entry have not been damaged during shipping.
 - Use only the screened cable when using a variable-frequency drive(VFD). The screened cable is necessary to fulfill necessary requirements. Contact your K-Hydro representative and ask your VFD supplier for electrical limitations.
-

**Grounding
(Earthing)**

Observe the following regulations for grounding connections.

- If grounding regulation specifies that all electric equipment must be grounded, pump as well as monitoring equipment should be grounded.
- If regulation specifies that the earthing conductors must be correctly connected, failure to this rule could result in a fatal accident.
- If regulation specifies the grounding conductors should always be longer than the phase conductors, the earthing conductors need to be disconnected last from its terminal when the motor cable is disconnected by mistake. This applies to both ends of the cable.

**Precautions
Before Work**

Observe these safety precautions before you work with the product or are in connection with the product:

- Provide a suitable barrier around the work area, for example, a guard rail.
- Make sure that all safety guards are in place and secure.
- Allow all system and pump components to cool before you handle them.
- Make sure that you have a clear path of retreat.
- Make sure that the product cannot roll or fall over and injure people or damage property.
- Make sure that the lifting equipment is in good condition.
- Use a lifting harness, a safety line, and a breathing device as required.
- Make sure that the product is thoroughly clean.
- Make sure that you have quick access to a first-aid kit.
- Disconnect and lock out power before servicing.
- Check the explosion risk before you weld or use electric hand tools.

**Precautions
During Work**

Observe these safety precautions when you work with the product or are in connection with the product:

- Never work alone
 - Always wear protective clothing and hand protection.
 - Stay clear of suspended loads.
 - Always lift the product by its lifting device.
 - Never lift the product by its motor cable or control cable.
 - Beware of the risk of a sudden start if the product is used with an automatic level control.
 - Beware of the starting jerk, which can be powerful.
 - Rinse the components in water after you disassemble the pump.
 - Do not open any vent or drain valve or remove any plugs while the system is pressurized. Make sure that the pump is isolated from the system and that pressure is relieved before you disassemble the pump, remove plugs, or disconnect piping.
 - Always bear in mind the risk of drowning, electrical accidents, and burn injuries.
-

**Clean Chemical
from the Eyes**

Hold your eyelids apart forcibly with your finger.
Rinse the eyes for at least 15 minutes. Use an eyewash or running water.
Seek medical attention

**Clean Chemical
from the Body**

Remove contaminated clothing.
Wash the skin with soap and water for at least 1 minute.
Seek medical attention.



**Explosion-Proof:
General Guideline**

Installation, Operation, and Maintenance manuals clearly identify accepted methods for disassembling units. These methods must be adhered to. Trapped liquid can rapidly expand and result in a violent explosion and injury. Never apply heat to impellers, propellers, or their retaining devices to aid in their removal. If there are any questions regarding these requirements, the intended use, or if the equipment requires modification, contact an K-Hydro representative before you proceed.

Explosion-proof is only fulfilled when the pump is operated within its intended use, for example within its intended hydraulic range. The conditions of the service must not be changed without approval of an authorized K-Hydro representative. When installing or maintaining explosion-proof pumps, follow these guidelines:

- Always install explosion-approved equipment in compliance with the directive and applicable standards (IEC/EN 60079–14).
- Always install explosion-proof approved products according to ANSI/NFPA 70-2005.

**Explosion-Proof:
Personnel
requirements**

K-Hydro disclaims all responsibility for work done by untrained and unauthorized personnel. These are the personnel requirements for Ex-approved products in potentially explosive atmospheres:

- All work on the product must be carried out by certified electricians and K-Hydro-authorized mechanics.
- Special rules apply to installations in explosive atmospheres.
- All users must know about the risks of electric current and the chemical and physical characteristics of the gas and/or vapor present in hazardous areas.
- The maintenance operation for Ex-approved products must be made in conformity to the international or national standards (IEC/EN 60079-17).

**Explosion-Proof:
Product Handling
Requirement**

These are the product and product handling requirements for approved products in potentially explosive atmospheres:

- Only use the product in accordance with the approved motor data stated on the nameplates.
- The approved product must never run dry during normal operation. Dry running during service and inspection is only permitted outside the classified area.
- See the dimensional drawings of the product for the minimum permitted water level. Level-sensing equipment must be installed if the product can be operated at less than the minimum submersion depth.
- Before you start working with the product, make sure that the product and the control panel are isolated from the power supply and the control circuit, so they cannot be energized.
- Do not open the product while it is energized or in an explosive gas atmosphere.
- Make sure that thermal protector are connected to a protection circuit according to the approval classification of the product.
- The yield stress of fasteners must be in accordance with the approval drawing and the product specification.
- Do not modify the equipment without approval from an authorized K-Hydro's representative.
- Only use parts that have been provided by an authorized K-Hydro's representative.

**Explosion-Proof:
Equipment for
Monitoring**

For additional safety, use condition-monitoring devices. Condition-monitoring devices include but are not limited to these devices:

- Level indicators
 - Temperature detectors
-

Recycling Guidelines

Always recycle according to these guidelines:

- If the unit or parts are accepted by an authorized recycling company, then follow local recycling laws and regulations.
 - If the unit or parts are not accepted by an authorized recycling company, then return them to the nearest K-Hydro's representative.
-

**Waste and Emission
Regulations**

Observe these safety regulations regarding waste and emissions:

- Dispose appropriately of all waste.
 - Handle and dispose of the pumped fluid in compliance with applicable environmental regulations.
 - Clean up all spills in accordance with safety and environmental procedures.
 - Report all environmental emissions to the appropriate authorities.
-

**Reference for Electrical
Installation**

For electrical installation requirements, consult your local electric utility.

3. Handling and Storage

Transportation

During transportation the pump should be secured in such a manner as to avoid shocks which may damage the pump.

Handle the pump carefully. Use the lifting handle or lifting eye provided and moves the pump with the aid of a hoist or proper handling equipment.



WARNING

The pump should never be moved by pulling the cable. There is a high possibility of damage which may result in an electric short and risk of shock. The cable and cable inlet may be damaged leading to loss of water tightness and subsequent severe damage to the motor.

Inspect the Unit upon Delivery

Inspect the package for damaged or missing items upon delivery.

Note any damaged or missing items on the receipt and freight bill.

File a claim with the shipping company if anything is out of order.

Unpack the Unit

Remove packing materials from the unit.

Dispose of all packing materials in accordance with local regulations.

Inspect the unit to determine if any parts have been damaged or are missing.

Contact your K-Hydro's representative if anything is out of order.

General Lifting Guidelines

The following are general guidelines for lifting the unit:

- Always use lifting equipment when handling the unit.
- When you use a lifting handle or eye-bolt for lifting the unit, make sure that the handle or eye-bolt is fastened firmly before lifting.
- The unit can be transported either horizontally or vertically.



WARNING

Crush hazard. The unit and the components can be heavy. Use proper lifting methods and wear steel-toed shoes at all times.

Do not attach sling ropes to shaft ends.

Stay clear of suspended loads.

Always lift the unit by its lifting handle. Never lift the unit by the motor cable or by the hose.

Lifting Equipment

The lifting equipment must fulfill the following requirements:

- The minimum height between the lifting hook and the floor must be sufficient to lift the unit out of the sump. Contact K-Hydro for information.
- The lifting equipment must be able to hoist the unit straight up and down in the sump, preferably without the need for resetting the lifting hook.
- The lifting equipment must be securely anchored and in good condition.
- The lifting equipment must support the entire assembly and must only be used by authorized personnel.
- Two sets of lifting equipment must be used to lift the unit for repair work.
- The lifting equipment must be dimensioned to lift the unit with any remaining pumped media (liquid) in it.
- The lifting equipment must not be over sized.

NOTICE

Over sized lifting equipment could cause damage if the unit should stick when being lifted.

Store the Unit

-
- After raising the unit, allow it to run for a short time to discharge all remaining pumped media (liquid).
 - The unit is frost-proof while operating or immersed in liquid, but the impeller and the shaft seal may freeze if the unit is raised in a temperature below freezing.
 - Store the unit in a covered and dry location free from heat, dirt, and vibrations.
 - If the unit is stored more than 6 months, rotate the shaft every other month to prevent the seals from sticking together.
 - Before operating the unit after storage: If the unit has been stored more than 6 months, then inspect the unit with special attention to the seals and the cable entry. If the impeller is frozen, then thaw the impeller by immersing the unit in liquid. Never use a naked flame to thaw the unit.
-

Warehouse Storage

- The warehouse must be free of excessive humidity, corrosive gases or vapors and free from vibration which might damage the pumps.
- Store the pumps in a vertical position on a pallet or stand to keep the pump off the floor and facilitate easy removal.
- The cable should be coiled and the open end should be tightly sealed with waterproof plastic and tape or a cable cap to prevent the penetration of moisture which may reach the motor and cause severe damage to the windings.
- All unpainted surfaces should be given a light coat of oil or grease to prevent corrosion.
- If new pumps are to be stored for longer than 2 months the pump impeller should be turned by hand every 2 months to prevent the mechanical seal faces from bonding whilst dry. Failure to do this may result in seal damage when the pump is eventually started.

Storage in the pit - system not in use

-
- If an installed pump is not in operation for an extended period of time, the insulation resistance should be measured and the pump runs for 30 minutes each month.
 - If the pump cannot be run due to lack of water in the sump it should be inspected and turned over by hand each month & prior to being put back into service. If the insulation resistance drops below 10 MΩ, contact your local K-Hydro office.
 - The power source must be shut off and isolated at the control panel when the pump is not in service.
 - If the pump is disconnected from the control panel when not in service, the cable end should be tightly sealed.
-

4. Product Description

Pump Design



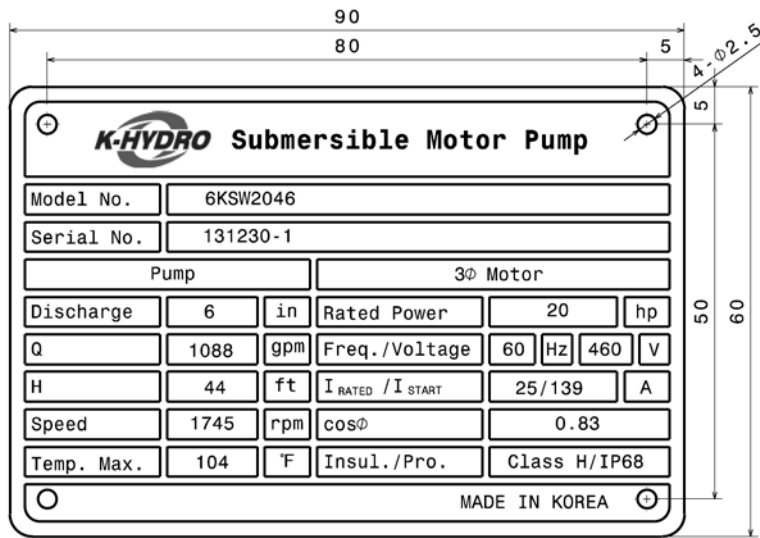
The pump is submersible and driven by an electric motor.

- Only use explosion-proof pumps in an explosive or flammable environment.
- Do not use the pump in highly corrosive liquids. For information about pH, see application limits (page 58)

Spare Parts

- Modifications to the unit or installation should only be carried out after consulting with K-Hydro.
- Original spare parts and accessories authorized by K-Hydro are essential for compliance. The use of other parts can invalidate any claims for warranty or compensation. For more information contact your K-Hydro's representative.

Nameplate (Example)



Model Number

K-Hydro's model number is designated as follows:

1st part: discharge nominal in mm (or inch) – Impeller Diameter in mm

2nd part: pump type, KAF=Axial Flow, KSW=Sewage, KGR=Grinder,
KCN=Contractor, KBS=Building Service, KCP=Circulation,
KAR=Aerator, KMX=Mixer

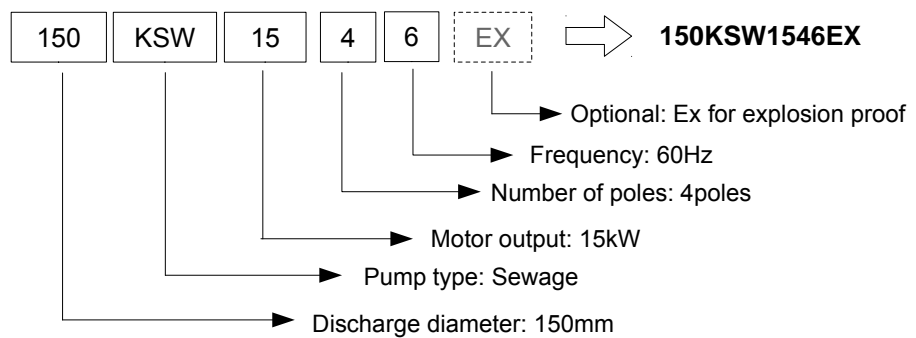
3rd part: rate motor output in kW (or HP)

4th part: motor poles

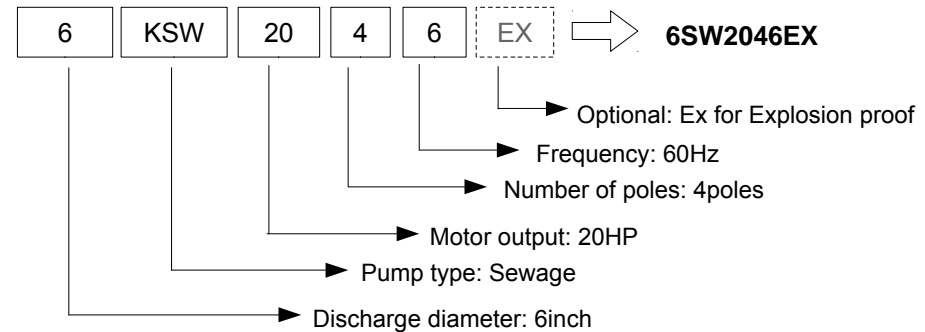
5th part: frequency of main supply, 5=50Hz, 6=60Hz

6th part: optional, for example, Ex for explosion-proof

Metric System



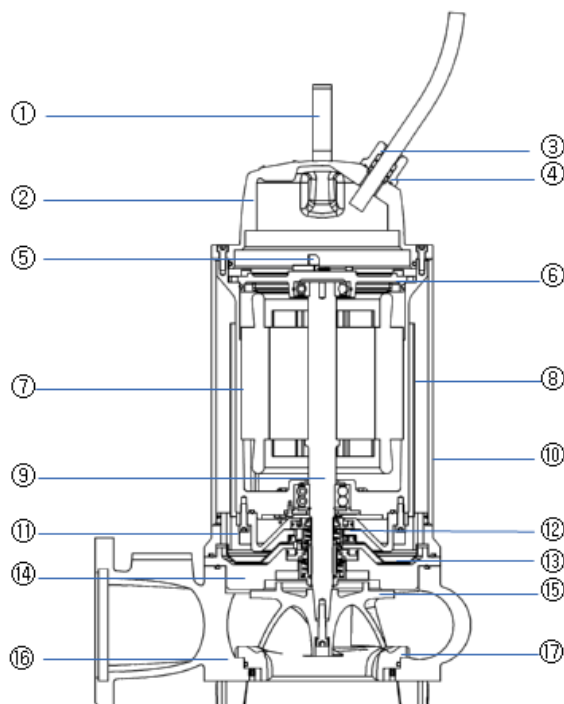
English System



Order Spare Parts

When ordering spare parts, state both parts number and quantity please. Genuine K-Hydro parts should be used for replacement if the product is to fulfill requirements and obtain official approval.

Parts



No.	Part	Description
1	Lifting Handle	Made of stainless steel 304
2	Entrance Cover	Connection of motor cables to main power supply lines
3	Entrance Flange	Watertight of the power cable by using seal sleeve
4	Seal Sleeve	Rubber Grommet, made of NBR
5	Terminal Block	Facilitates the cable connection and blocks the intrusion of water into the stator housing.
6	Support Bearing Holder	Incorporated with support bearing which is single-row ball bearing.
7	Stator Housing	Incorporated with main bearing which double-row ball bearing
8	Cooling Jacket Inner	Made of stainless steel 304
9	Shaft	Stainless steel 410, with an integrated rotor
10	Cooling Jacket Outer	The motor is cooled by a closed loop system. An integrated cooling system circulates the coolant whenever the pump is operated.
11	Adapter	Equipped with a leakage sensor to prevent damages to the motor
12	Seal Cartridge	Made of SiC (both inner and outer seals)
13	Flow Diffuser	Provides the coolant in the seal housing to the heated stator housing.
14	Seal Housing Cover	Includes a coolant that lubricates and cools the seals. Housing acts as a buffer between the pumped media(liquid) and the electric motor.
15	Impeller	semi-open, two-vane impeller with 3" solid handling
16	Pump Casing	Back pull out design. The motor can be detached without removing the impeller. It allows for easier and more efficient maintenance.
17	Insert Ring	Non-clog function

Monitoring Equipment

The following applies to the monitoring equipment of the pump:

- Normally the stator incorporates thermal protector connected in series that activates the alarm at over-temperature.
- The sensors must be connected to either the Mini-MU monitoring unit or an equivalent unit.
- The thermal protector opens at 120°C (248°F).
- Explosion-proof pumps must have thermal protector connected to the control panel.
- The monitoring equipment must be of a design that makes automatic restart impossible.
- The pump is supplied with an inspection sensor for sensing the presence of any liquid in the inspection chamber.

Optional Sensors

Thermistor is an optional sensor for measuring the temperature of stator coil. PT100Ω is normally used for thermistor. These are connected in series in the stator coils and activate the alarm at over-temperature.

NOTICE

Thermistor must never be exposed to voltages higher than 2.5 V. If the voltage exceeds this value, for example when the control circuit is tested, the thermistor will be destroyed.

5. Installation

Install the Pump



NOTICE

These requirements apply:

- Use the pump dimensional drawing in order to ensure proper installation. Check that the dimensions of the sump are correct and large enough so that the pump can be installed and removed for servicing.
- Thoroughly clean and remove all rubbish from the sump and general installation area to prevent clogging the impeller causing possible motor failure.
- Check the accessories and controls are complete.
- In dry pit installations, the pump must be equipped with cooling jacket
- Provide a suitable barrier around the work area, for example, a guard rail.
- Remove all debris from the inlet piping system before you install the pump.
- To prevent mechanical damage, all cables laid under ground must be properly installed in underground electrical conduit specifically designed for this purpose, cables must not be installed directly in the ground or in concrete.
- Ensure all electrical cables are securely supported and that there is no loose cable which could be sucked into the pump inlet.
- After installing the pump, secure the lifting chain or wire rope to a wall or other rigid surface, outside of the pit, to prevent submerged in wastewater.

Before installing the pump, check that the cable and cable entry have not been damaged during transportation.

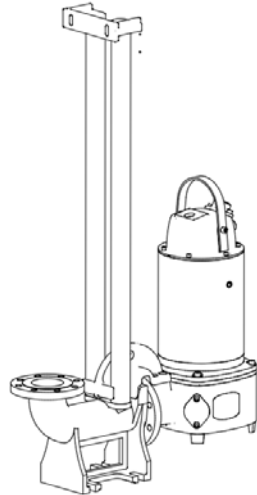
- Note that special rules apply to installation in explosive atmospheres.
- Make sure that the pump cannot roll or fall over and injure people or damage property.

Do not run the pump dry.

Never force piping to make a connection with a pump.

GR Installation:
General

In the GR installation, the pump is installed on a stationary automatic coupling system(ACS), and operates either completely or partially submerged in the pumped liquid. These requirements and instructions only apply when the installation is made according to the dimensional drawing.



These items are required(refer to the parts list of the pump):

- Guide rails consisting of two hot dip galvanized or stainless steel pipes.
 - Guide rail bracket for attaching the guide equipment to the access frame or to the upper part of the sump.
 - Level regulators or other control equipment for start, stop, and alarm
 - Cable holder for holding the cable and regulating the height of the level regulators.
 - Access frame (with covers) to which the upper guide rail bracket and cable holder can be attached.
 - ACS body for connecting the pump to the discharge line. The ACS body has a flange which fits the pump casing flange.
 - Sliding bracket for guiding pumps when lifting and lowering pumps.
 - Bushes for vibration damping between the guide rails and the ACS body.
 - Fasteners for the ACS body and anchor bolts.
-

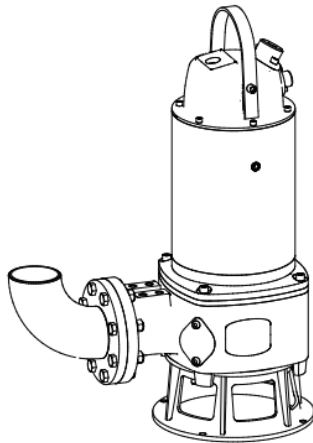
GR Installation:
Procedure

-
1. Run a cable between the sump and the monitoring equipment.
Make sure that the cable is neither sharply bent, nor pinched.
 2. Install the access frame:
 - a) Place the access frame in position and align it horizontally.
 - b) Grout the frame in place.
 3. Grout the anchor bolts in place. Be careful when you align and position the ACS body in relation to the access frame.
 4. Place the ACS body in position, and tighten the nuts.
 5. Install the guide rails:
 - a) Secure the guide rails in the bracket.
 - b) Check that the guide rails are placed vertically. Use a level.
 6. Connect the discharge pipe to the ACS body.
 7. Prepare for the level regulator:
 - a) Bolt the cable holder to the access frame.
 - b) Thread the level regulator cable through the holes in the cable holder, and adjust the height of the level regulators.
 - c) Protect bolts and nuts with a corrosion-preventive compound.
 8. Lower the pump along the guide rails.
 9. Secure the motor cable:
 - a) Fasten the permanent lifting device to the pump and to the access frame. For example, you can use a stainless-steel lifting chain with shackles.
 - b) Fasten the cable to the cable holder. Make sure that the cable cannot be sucked into the pump inlet or that it is neither sharply bent, nor pinched. Support straps are required for deep installations.
 - c) Connect the motor cable and the starter and monitoring equipment according to the separate instructions. Make sure that the impeller rotation is correct. For more information, see Check the impeller rotation (page 34).
 10. Clean all debris from the sump before starting the pump.
-

FS Installation:
General

In the S-installation, the pump is transportable and intended to operate either completely or partially submerged in the pumped liquid. The pump is equipped with a connection for hose or pipe and stands on a base stand.

These requirements and instructions only apply when the installation is made according to the dimensional drawing. For more detailed information about the different installation types, see the Parts List document.

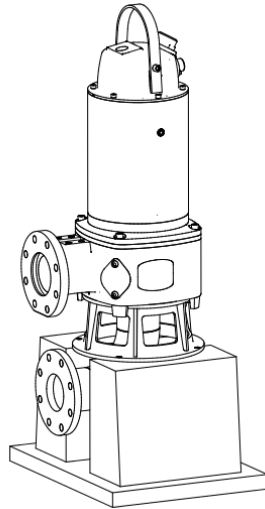


FS Installation:
Procedure

1. Run the cable so that it has no sharp bends, is not pinched, and cannot be sucked into the pump inlet.
 2. Connect the discharge line.
 3. Lower the pump into the sump.
 4. Place the pump on the base and make sure it cannot fall over or sink if anchor bolts are not used.
Alternatively, the pump can be suspended with a lifting chain just above the sump bottom. Make sure that the pump cannot rotate at startup or during operation.
 5. Connect the motor cable and the starter and monitoring equipment according to the separate instructions. Make sure that the impeller rotation is correct. For more information, see Check the impeller rotation (page 34).
-

DV Installation:
General

The pump is installed in a vertical position in a dry well next to the wet sump. These requirements and instructions only apply when the installation is made according to the dimensional drawing.



These items are required:

- Support stand and anchor bolts for anchoring the pump to a base Inlet elbow for connecting the suction line and discharge line
- Shut-off valves that allow you to remove the pump from service
- Air vent on the discharge side between the pump and the check valve
- Level regulators or other control equipment for start, stop, and alarm

In addition to the pump, the following items are required:

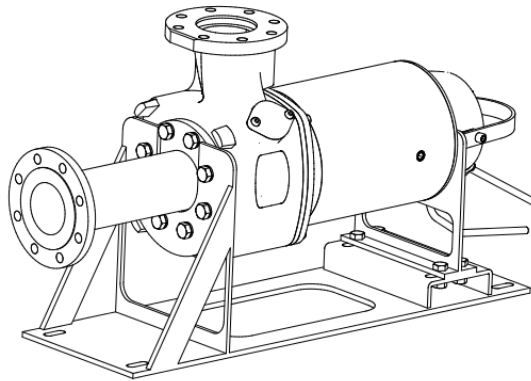
- Plate and anchor bolts for anchoring the pump to a concrete base.
- Base stand and suction connection are integrated.
- Bolt the suction cover to the concrete base by means of four anchor bolts.

DV Installation:
Procedure

1. Fasten the pump:
 - a) Use the anchor bolts to bolt to the concrete base.
 - b) Bolt the pump to the suction connection.
2. Make sure that the pump is vertical.
3. Connect the suction line and discharge line.
4. Connect the motor cable and the starter and monitoring equipment according to the separate instructions. Make sure that the impeller rotation is correct. For more information, see Check the impeller rotation (page 34).
5. Make sure that the weight of the pump does not put strain on the piping.

DH Installation:
General

The pump is installed in a horizontal position on a support stand in a dry well next to the wet sump, and a flanged pipe fitting is connected to the inlet pipe. These requirements and instructions are for DH-installations that comply to the dimensional drawing.



These items are required:

- Support stand and anchor bolts for anchoring the pump to a base
- Flanged pipe fitting for connecting the suction line and discharge line
- Shut-off valves that allow you to remove the pump from service
- Air vent on the discharge side between the pump and the check valve
- Level regulators or other control equipment for start, stop, and alarm

DH Installation:
Procedure

1. Fasten the pump:
 - a) Use the anchor bolts to bolt the support stand to the concrete base.
 - b) Bolt the pump to the support stand.
2. Make sure that the pump is horizontal.
3. Connect the flanged pipe fittings to the suction line to discharge line.
4. Connect the motor cable and the starter and monitoring equipment according to the separate instructions. Make sure that the impeller rotation is correct. For more information, see Check the impeller rotation (page 34).
5. Make sure that the weight of the pump does not put strain on the piping.

NOTICE

The risk of freezing is particularly high in DV- or DH-installations.

6. Electrical Connection



Electrical Hazard:

- A certified electrician must supervise all electrical work. Comply with all local codes and regulations.
- Before starting work on the pump, make sure that the pump and the control panel are isolated from the power supply and cannot be energized. This applies to the control circuit as well. If the pump is equipped with automatic level control, there is a risk of sudden restart.
- Leakage into the electrical parts can cause damaged equipment or a blown fuse. Keep the end of the motor cable above the liquid level.
- Make sure that all the conductors that are not used are insulated.
- There is a risk of electrical shock or explosion if the electrical connections are not correctly carried out or if there is fault or damage on the product.

Requirements

These general requirements apply for electrical installation:

- The supply authority must be notified before installing the pump if it will be connected to the public mains. When the pump is connected to the public power supply, it may cause flickering of incandescent lamps when started.
 - The main voltage and frequency must agree with the specifications on the nameplate. If the pump can be connected to different voltages, the connected voltage is specified by a yellow sticker close to the cable entry.
 - The fuses, short-circuit, and circuit breakers must have the proper rating, and the pump overload protection (motor protection breaker) must be connected and set to the rated power according to the data plate. The starting current in direct-on-line starting can be up to six times higher than the rated current.
 - The fuse rating and the cables must be in accordance with the local rules and regulations.
 - If intermittent operation is prescribed, the pump must be provided with monitoring equipment supporting such operation.
 - The motor is convertible between dual voltages, as stated on the nameplate. This conversion is done on the terminal board easily.(refer to page 32)
-

Cables

These are the requirements to follow when you install cables:

- The cables must be in good condition, not have any sharp bends, and not be pinched.
- The sheathing must not be damaged and must not have indentations or be embossed (with markings, etc.) at the cable entry.
- The cable entry seal sleeve and washers must conform to the outside diameter of the cable.
- The minimum bending radius must not be below the accepted value.
- If using a cable which has been used before, a short piece must be peeled off when refitting it so that the cable entry seal sleeve does not close around the cable at the same point again. If the outer sheath of the cable is damaged, then replace the cable.
- The voltage drop in long cables must be taken into account. The drive unit's rated voltage is the voltage measured at the terminal board in the upper part of the pump.
- The screened cable must be used if a Variable Frequency Drive (VFD) is used.
For more information, contact K-Hydro representative or VFD-supplier.

Grounding(Earthing)

You must earth (ground) all electrical equipment. This applies to the pump equipment, the driver, and any monitoring equipment. Test the earth (ground) lead to verify that it is connected correctly.

If the motor cable is jerked loose by mistake, the earth (ground) conductor should be the last conductor to come loose from its terminal. Make sure that the earth (ground) conductor is longer than the phase conductors. This applies to both ends of the motor cable.

Since having the risk of electrical shock or burn, you must connect an additional earth- (ground-) fault protection device to the earthed (grounded) connectors if persons are likely to come into physical contact with the pump or pumped liquids.

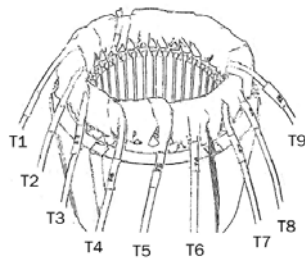
Terminal Markings of Various Cables

Upper alphabets or an Arabic number is used to differentiate the cable leads as follows:

- 1. Motor(Power) Cable: 1(L1), 2(L2), 3(L3), 4(G) in case of 8 cores
Control(Sensor) Cable: 5(TP1), 6(TP2), 7(S1), 8(C) in case of 8 cores

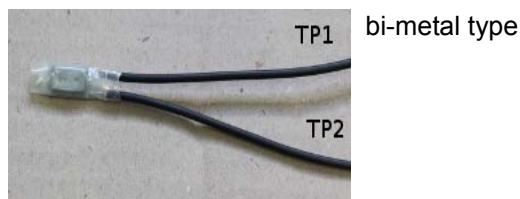


- 2. Stator Cable: T1, T2, T3, ... , T9 in case of 9 leads



- 3. Sensor Cable:

·Stator Thermal Protector - TP1, TP2

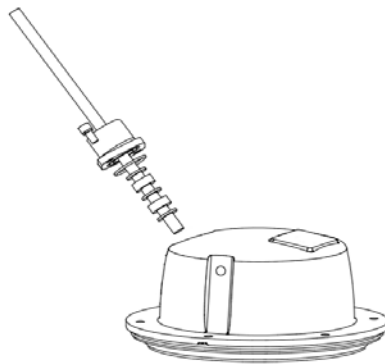


·Leakage Seal Sensor – S1, C(com)



Connecting Cable to the Pump

1. 6KSW546 model has only one cable entry and has an 8 cores cable. Cores from 1 to 4 are for an electric motor and from 5 to 8 are for sensors.
2. Cable core 4 is for earth(ground) and cable core 8 is for common of leakage seal sensor.
3. Connect the cable core 1,2,3 to the terminal block #1, #2, #3 respectively and cable core (4) to the earth screw.
4. The earth core 4 must be 4.0 in.(100 mm) longer than the phase conductor 1,2,3 in the entrance cover of the unit.
5. Connect the cable core 5, 6 to the terminal block#4, #5 and cable core. This is for Thermal Protector of electric motor,
6. Connect the cable core 7 to the terminal block #6 and the cable core 8 to the earth screw which also act as a common for leakage seal sensor.



Leakage into the electrical parts can cause damaged equipment or a blown fuse. Keep the end of the motor cable above the liquid level.

Connecting Motor Cable to the Starter and Monitoring Unit

1. If thermal protector is used in the stator coil, then connect the cable core 5 and 6 to the Mini-MU monitoring equipment.
2. If leakage seal sensor is used, then connect the cable core 7 and 8 to MU monitoring equipment.
3. Connect the cable core 1, 2, 3, and 4 to the starter equipment.
4. Check the functionality of the monitoring equipment:
 - a) Check that the signals and the tripping function work properly.
 - b) Check that the relays, lamps, fuses, and connections are intact.Replace any defective equipment.



NOTICE

Do not install the starter equipment in an explosive zone or in the sump.

Thermal protector must never be exposed to voltages higher than 250 V, breaking current maximum 4 A. It is recommended that they are connected to 24 V over separate fuses to protect other automatic equipment.

Insulation Check:
Motor Cable

It describes how to check for correct wiring and how to identify the individual cables if the original tags have been removed during installation.

- For Direct On Line(DOL) start, ensure that the insulation resistance between each phase and earth exceeds 10 MΩ
- Connect one of the three phase wires to the Earth Link of a Mega Tester and measure the insulation resistance of the remaining two wires. The insulation resistance should be less than 1 MΩ. If not, to avoid motor damage do not operate the pump.

Insulation Check:
Thermal Protector

The resistance of thermal protector sensor should be 0 Ω. It is normally closed and opens when it is heated over 120°C.



In any case, do not use Mega Tester to check the insulation performance of sensors. If measured by Mega Tester, the sensor might be damaged and would not operate properly.

Insulation Check:
Leakage Sensor

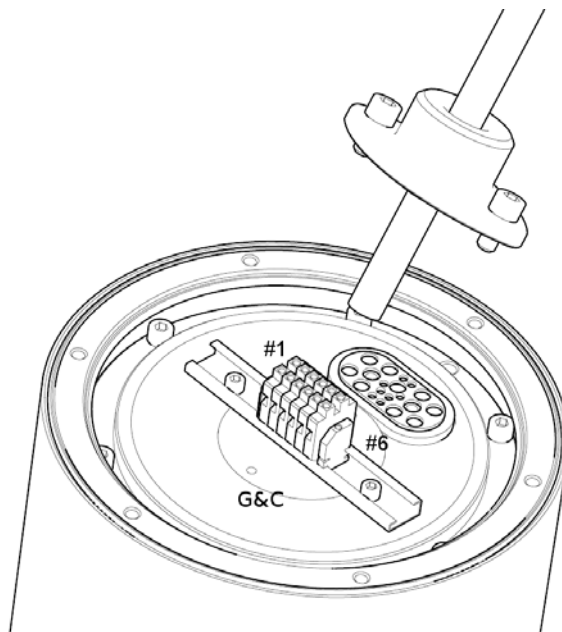
There are only one wire. The other wire would be pump case. The resistance between the sensor lead and pump casing measured with a multimeter should be over 20 KΩ.

**Wiring
Terminal Block**

1. Connect 6 cable cores (1~3, 5~7) to the 6 terminal blocks. You can see the numbers on the terminal blocks. Below figure shows the example of 8 core cable connection to the terminal blocks and an G&C screw. Cable core 8 is connected to G&C(ground and common)) and cable core 8 is also connected to G&C.

8 core Cable	1	2	3	4	5	6	7	8
Terminal Block	#1	#2	#3		#4	#5	#6	
Screw				G&C				G&C

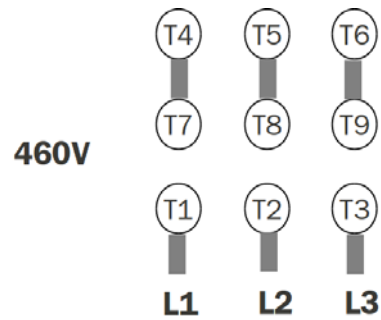
2. Tighten the screws of the terminal blocks securely in order not to come out the cable cores.



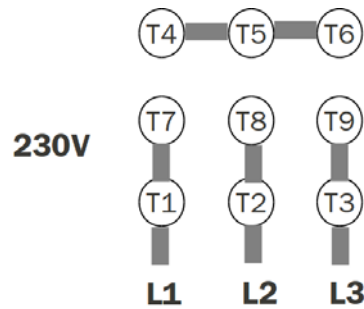
T 3

**Wiring Stator leads
in case of
Dual Voltages
(460V/230V)**

In case of dual voltage configuration(460V/230V), K-Hydro's default connection is star Y 460V as showing below figure unless specified otherwise.



If you want to change the voltage from 460V to 230V, modify the connection as follows.

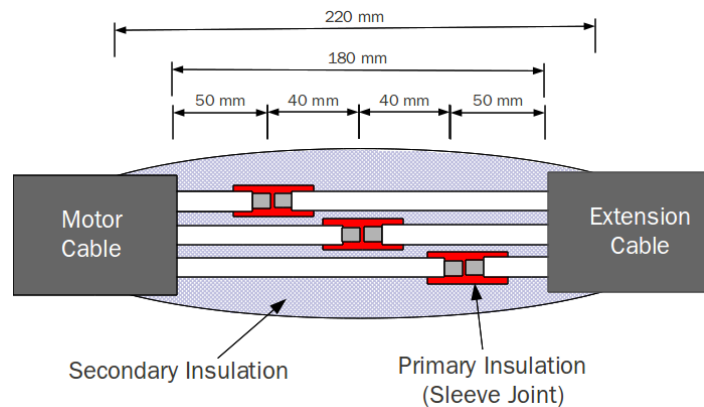


NOTICE

Connection is carried out direct line to line type. Three more terminal blocks with three Jumper wires can be used as an option.

Cable Joints

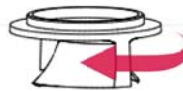
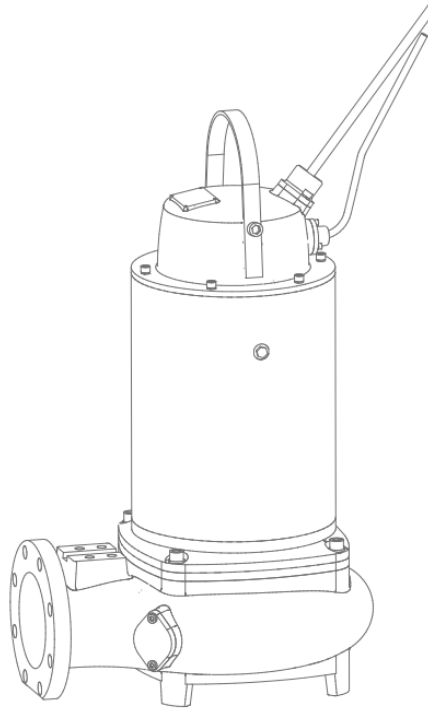
If it is necessary to extend the pump supply cable, ensure that the cross sectional area of the extension cable used keeps sufficient cross sectional area to absorb voltage drop. Ensure that the cable joint is waterproof and secure. Connect each pair of wires using a sleeve joint and staggering the joints as shown below.



- Primary Insulation layer: Paste each individual wire joint with glue and wind with a strip of natural rubber. Then wind with waterproof vinyl.
- Secondary Insulation layer: Gather together all the individual wires into one cable and repeat the above insulating procedure on the complete cable ensuring that the insulation covers the original cable insulation at both ends by a minimum of 220mm. The thickness of the joint must be less than twice the original cable diameter.

Impeller Rotation

1. Start the motor.
2. Stop the motor.
3. Check that the impeller rotates according to this illustration. The correct direction of impeller rotation is clockwise when you look at the pump from above.
4. If the impeller rotates in the wrong direction, transpose two phase leads (3-phase) and do this procedure again.



7. Operation

Start the Pump

1. Remove the fuses or open the circuit breaker, and check that the impeller can be rotated freely.
2. Check the insulation resistance of three phases to ground respectively. To pass, the value must exceed 10 M Ω . (refer to Insulation Check page 30)
3. Ensure that all cables from the pump including sensor cables have been securely connected to the appropriate terminals in the control box.
4. Check that the monitoring equipment works.
5. Check that the Pit or Sump is clean and free from rubbish.
6. Start the pump using the following sequence of events
 - Open the gate valve.
 - Set the THR and Timer according to its manual.
 - Turn on the main supply isolator in the control panel. Set the selector switch to manual and jog the pump by momentarily starting it before fully starting.
 - Start the pump and read the current variation while opening the discharge valve slowly. Check if the current is within the rated current of the pump with the discharge valve fully open.
 - If the current exceeds the rated current, record the voltage and current then stop the pump. Check the system and provide the details listed below to K-Hydro.
 - The current and voltage during operation
 - Nature and viscosity of the liquid
 - Piping layout and configuration (H1,H2,H3,H4). Number and type of all bends valves tees and fittings.
 - Diameter and total length of the pipe
 - If the operating current is within the rated current, monitor the variation over 1 hr of continuous operation. If it remains stable, stop the pumps and set the level switch positions to complete commissioning.



If you need to work on the pump, make sure that it is isolated from the power supply and cannot be energized.

- Make sure that the pump cannot roll or fall over and injure people or damage property.
- In some installations, the pump and the surrounding liquid may be hot. Bear in mind the risk of burn injuries.
- Make sure nobody is close to the pump when it is started. The pump will jerk in the opposite direction of the impeller rotation.



Risk of electrical shock when pumping or mixing near a lake, jetties, beaches, ponds, fountains, or similar. There must be a safety distance of at least 65 ft (20 m.) between the person and the product if the person is in contact with the pumped or mixed liquid.

8. Maintenance

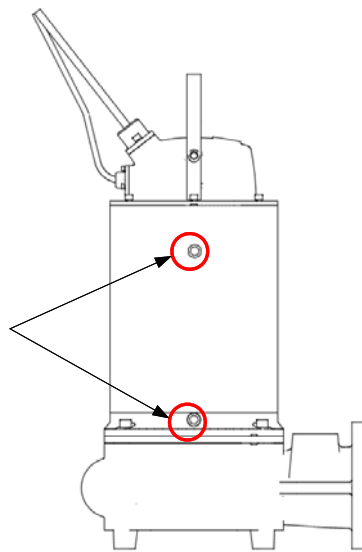
General Guideline

During maintenance and before reassembly, always remember to perform these tasks:

- Clean all parts thoroughly, particularly O-ring grooves.
- Change all O-rings, gaskets, and seal washers.
- Lubricate all springs, screws, and O-rings with grease.

During reassembly, always make sure that O-ring threaded plugs are in line.

O-ring Threaded
Plugs:
1. Coolant-in
2. Inspection



Torque Value Guideline

Hex. Socket Head Screw

unit: N·m (ft·lbs)



Material	Class	M4	M6	M8	M10	M12	M16	M20	M24	M30
Stainless Steel	70 &	2.7	9.3	22	44	76	187	364	629	1240
	80	(2)	(6.9)	(16)	(32)	(56)	(138)	(268)	(464)	(915)
Carbon Steel and Alloyed Steel	8.8	2.9 (2.1)	9.8 (7.2)	24 (18)	47 (35)	81 (60)	194 (143)	385 (285)	665 (490)	1310 (966)
	10.9	4.0 (2.9)	14 (10.3)	33 (24)	65 (48)	114 (84)	277 (204)	541 (399)	935 (689)	1840 (1357)
	12.9	4.9 (3.6)	17 (12.5)	40 (30)	79 (58)	136 (100)	333 (245)	649 (480)	1120 (825)	2210 (1630)



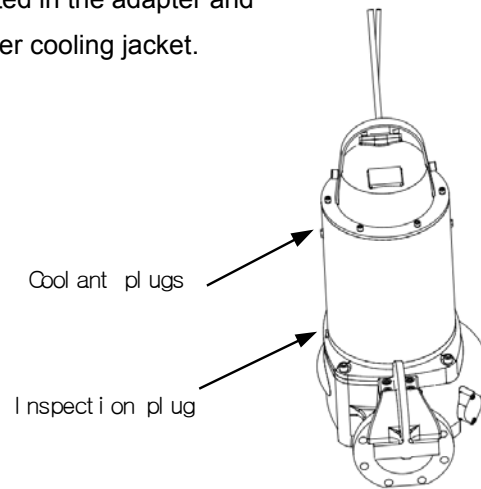
Flat Head Cap Screw

unit: N·m (ft·lbs)

Material	Class	M4	M5	M6	M8	M10	M12	M16	M20	M24
Stainless Steel	70 &	1.2	2.7	5.4	9.3	22	44	76	120	187
	80	(0.9)	(2)	(4)	(6.9)	(16)	(32)	(56)	(88)	(138)
Carbon Steel and Alloyed Steel	8.8	2.3 (1.7)	4.6 (3.4)	7.8 (5.8)	19 (14)	38 (28)	65 (48)	158 (116)	308 (228)	532 (392)
	10.9	3.2 (2.4)	6.5 (4.8)	11 (8)	26 (19)	52 (38)	91 (67)	222 (164)	433 (320)	748 (552)
	12.9	3.9 (2.9)	7.8 (5.8)	14 (10.3)	32 (23.6)	63 (46)	109 (80)	266 (196)	519 (383)	896 (611)

O-ring Threaded Bolt and Plug Location

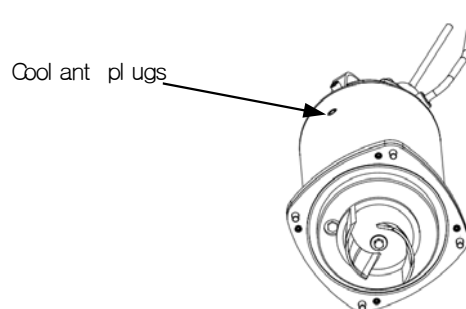
An O-ring threaded bolt is located in the adapter and two coolant plugs are on the outer cooling jacket.



Coolant Emptying



1. Empty the coolant in the inspection chamber:
 - a) Remove the inspection O-ring threaded bolt.
 - b) Pump out any coolant from the inspection chamber with suction gun or syringe.
 - c) Replace the inspection O-ring threaded bolt and tighten.
Tightening torque: 33 ft-lbs (44 Nm)
2. Empty the coolant:
 - a) Place the pump in a vertical position and remove the drive unit from the pump casing (refer to page 40) :
 - Remove the four pump casing screws.
 - Remove the drive unit from the pump casing.
 - b) Lay down the drive unit. Remove the coolant plug and empty the coolant.



Both coolant and inspection chambers may be pressurized. Hold a rag over the inspection/coolant plugs to prevent splatter.

Coolant Filling

Use a coolant that has a 100% mono propylene glycol(MPG). Water can be used with MPG and mix up to 70% with anti-corrosion additives. The coolant should prevent corrosion and be nonpoisonous (generally recognized as safe by the FDA as food additives under part 184 and 182).

NOTICE

Clean water with an anti-corrosion additives is an acceptable coolant when there is no risk of freezing.

1. Fill with coolant until it overflows through the opposite hole.

Quantity: approximately

- 13.9 US quarts (13 liters) with cooling jacket

2. Replace the O-rings.
3. Tighten the coolant plugs. Tightening torque: 33 ft-lbs (44 Nm)

Impeller Replacement:

General

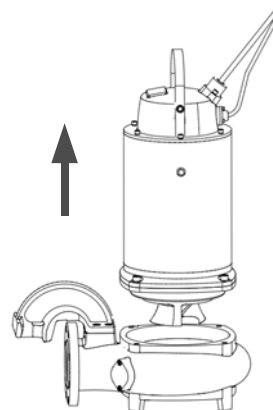


The following items are needed for these procedures:

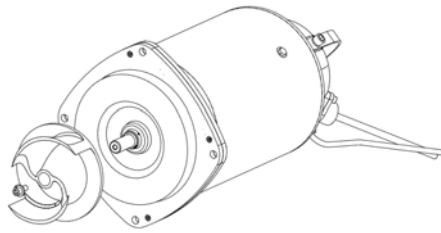
- M10 hexagon socket head screw wrench
 - Rod (wood or plastic) for locking the impeller in place.
- If you fail with the impeller installation, you must redo the installation procedure from the beginning.
- A worn impeller and/or pump casing can have very sharp edges. Wear protective gloves.
- When laying the pump on its side, do not allow the weight of the pump to rest on any portion of the impeller. The impeller must not be allowed to make contact with the concrete floor or other hard and rough surfaces.

Impeller Removal for Wet Installation

1. Place the pump in a vertical position.
2. Remove the drive unit from the pump casing :
 - a) Remove the four pump casing screws.
 - b) Remove the drive unit from the pump casing.



3. Remove the impeller.
 - a) Place the drive unit horizontally.
 - b) Remove the impeller screw and plain washer.
 - c) Remove the impeller



Impeller Installation for Wet Installation

1. Fit the impeller:
 - a) Make sure that the end of the shaft is free from burrs. Polish off any flaws with a fine emery cloth.
 - b) Grease the shaft end.
 - c) Grease the washer, and the impeller screw.
 - d) Fit the impeller to the shaft with the sunk key.
 - f) Hand-tighten the impeller screw to prevent it from falling off. If the impeller screw is not clean and easily screwed back into the shaft, then replace the screw. Two washers are needed to impeller screw, i.e. spring and plain washers.

NOTICE

The impeller can become loose. Remove any surplus grease from surfaces of shafts.

2. Fit the pump casing:
 - a) Fit a new and greased O-ring on the pump casing.
 - b) Grease the pump casing screws.
 - c) Raise the drive unit.
 - d) Place the drive unit into the pump casing.
 - e) align its position with alignment grooves so that the inspection hole is on the opposite side of flush valve.
 - f) Tighten the screws in diagonal sequence.
3. Adjust the gap between impeller and insert ring:
 - a) Place the pump horizontally.
 - a) Using adjustment screws, adjust the gap between impeller and insert ring until 0.5mm.
 - b) Fit the greased washer and insert ring screw.
 - c) Tighten the insert ring screw.



Beware of the pinch point hazard between the rotating impeller and the insert ring.

Impeller Removal for Dry Installation

-
1. Remove the drive unit from the pump casing:
 - a) Remove the pump casing screws.
 - b) Remove the drive unit from the pump casing.
 2. Remove the impeller:
 - a) Place the drive unit horizontally.
 - b) Lock the impeller by using rod.
 - c) Remove the impeller screw and the impeller.
-

Impeller Installation for Dry Installation

-
1. Prepare the shaft:
 - a) Make sure that the end of the shaft is free from burrs. Polish off any flaws with a fine emery cloth.
 - b) Grease the shaft end.
 - c) Grease the washer, and the impeller screw.
 2. Fit the impeller:
 - a) Fit the impeller to the shaft.
 - b) Fit the impeller screw and washer and tighten.
 - c) Tighten the impeller screw further 1/8 turn (45°).
 3. Install the drive unit in the pump casing:
 - a) Fit a new and greased O-ring to the pump casing.
 - b) Place the drive unit in the pump casing.
 - c) Align the position of the drive unit with alignment grooves so that the inspection hole is on the opposite side as the flush valve. Tighten the screws diagonally.
-

NOTICE

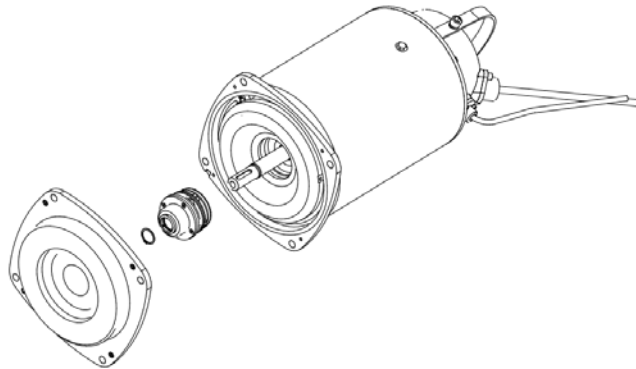
The impeller can become loose. Remove any surplus grease from the surfaces of shafts.

Impeller Adjustment

1. Remove the drive unit from the pump casing.
 2. Remove the impeller.
 3. Adjust the gap between impeller and insert ring:
 - a) Using adjustment screws, adjust the gap between impeller and insert ring until 0.5mm.
 - b) Fit the greased washer and insert ring screw.
 - c) Tighten the insert ring screw.
-

Mechanical Seal Cartridge Removal

1. Remove the drive unit from the pump casing.
2. Remove the impeller from the rotor shaft.
3. Remove the seal housing cover from the drive unit.
4. Unlock the snap ring of mechanical seal cartridge on the shaft.
5. Remove the mechanical seal cartridge from the shaft by using screw drivers.



Mechanical Seal Cartridge Installation

1. Clean the surface of rotor shaft.
2. Fit new and greased O-rings to the mechanical seal cartridge.
3. Insert seal cartridge to the shaft until it touches to the adapter.
4. Clip the snap ring on the shaft during pressing the mechanical seal cartridge cover.
5. Tight three hex-socket set screws on the cartridge sleeve to fix cartridge propeller to the rotor shaft firmly.
5. Fit the seal housing cover to the adapter.
6. Fit the impeller to the shaft.
7. Connect the drive unit to the pump casing.

Checking Seals

After assembling the mechanical seal cartridge, seal chamber should be tested for leaks.

The coolant inlet tap is used to test for leaks. Securely screw the testing device into the coolant inlet tap.

- Test media: Compressed air
- Test pressure: max. 2 bar (0.2MPa)
- Test duration: 2 min.

Make sure that the pressure does not decrease during the test. Afterwards, fill the seal chamber with coolant (mono propylene glycol).

Service the Pump

Regular inspection and service of the pump ensures more reliable operation.

- Monthly Inspection: Every month
- Intermediate service: Every years/4,000 hours

(For standard sewage applications with leakage seal sensor in use and a pumped liquid temperature of 40°C (104°F) or less.)

- Major service in an authorized service shop : Every 3 years/12,000 hours
(May vary considerably depending on operating conditions.)

Monthly Inspection

Since the life of the pump depends largely on the operating conditions, daily inspection and periodic servicing are strongly recommended to guarantee maximum product lifetime.

Checking part	Measures
Voltage and Amperage	Check the running values. If the ammeter reading exceeds the rated value, or is far lower than rated value, there is a problem with the pump. Voltage should be stable within (plus minus) 10% of the rated value throughout the operational period.
Vibration	Check that the pump is operating smoothly and without vibration
Discharge Pressure and Flow Rate	Check the discharge pressure and flow rate (If flow meter is provided) at least once a month. Declining performance can be indicative of the need for overhaul. Regardless of performance the pressure and flow rate should be stable and rapidly changing output or pressure is indicative of system problems on the suction or delivery side.
Insulation Resistance	Check the insulation resistance of the motor at least monthly. If the value of the insulation resistance has declined sharply from the previous reading this is indicative of impending insulation failure and the pump should be scheduled for service even though the insulation resistance may still be over 10 MΩ.

Intermediate Service

Checking part	Measures
Cable	<ol style="list-style-type: none"> 1. If the outer jacket is damaged, replace the cable. 2. Check that the cables do not have any sharp bends and are not pinched.
Connection to Power	Check that the connections are properly tightened.
Electrical Cabinet	Check that they are clean and dry.
Impeller	<ol style="list-style-type: none"> 1. Check the impeller clearance. 2. Adjust the impeller, if necessary.
Inspection Chamber	<ol style="list-style-type: none"> 1. Drain all liquid with suction gun or syringe, if any. 2. Check the resistance of the leakage sensor. In electrode type, the resistance between two leads should be ∞.
Insulation	<ol style="list-style-type: none"> 1. Check that the resistance between the earth (ground) and phase lead is more than 10 MΩ. 2. Conduct a phase-to-phase resistance check.
Entrance Cover	Check that it is clean and dry.
Level Regulators	Check the condition and functionality.
Lifting Device	Check that local safety regulations are followed.
Lifting Handle	<ol style="list-style-type: none"> 1. Check the screws. 2. Check the condition of the lifting handle. 3. Replace if necessary.
O-rings	<ol style="list-style-type: none"> 1. Replace the O-rings of plugs 2. Replace the O-rings at the entrance or seal housing cover. 3. Grease the new O-rings.
Overload Protection	Check the correct settings.
Personnel Safety Device	Check the guard rails, covers, and other protections.
Rotation Direction	Check the impeller rotation.
Seal Housing	<ol style="list-style-type: none"> 1. Fill with new coolant, if necessary. 2. Check that the freezing point is lower than -13°C (9°F).
Terminal Block	Check that the screws are properly tightened.
thermal protector	Check the resistance of the thermal protector sensor. Normally closed circuit; interval 0~1 Ω .
Thermistor	Check the resistance is between 20~250 Ω and the measured voltage is maximum 2 V DC.

Major Service

For a major service, take this action, in addition to the tasks listed under intermediate service.

Checking part	Measures
Support and Main Bearing	Replace the bearings with new bearings.
Mechanical seal cartridge	Replace with new seal cartridge.

Service when Alarmed

Checking part	Measures
Leakage Seal Sensor	<ol style="list-style-type: none">1. Drain the fluid in the inspection chamber. Fill with new coolant into the seal housing if necessary.2. Check the freezing point (lower than -13°C or 9°F). Check the inspection chamber again after one week of operation. If leakage has occurred:<ol style="list-style-type: none">1. Drain the fluid.2. Change the motor side mechanical seal unit in the seal cartridge.3. Replace with new coolant.
Thermal protector	<ol style="list-style-type: none">1. Check the coolant level in case of pump with cooling jacket).2. Check the start and stop levels of water surface.
The overload protection	Check that the impeller can rotate freely.

Stock Keeping of Spare Parts

Recommended stock of spare parts for two year operation according to K-Hydro's experiences.

Part No.	Part Name	No. of Pumps including standby pump						
		2	3	4	5	6	8	>10
971	Stator				1	1	2	3
972	Shaft Unit				1	1	2	3
521	Impeller	1	1	1	2	2	3	4
531	Insert Ring	1	1	1	2	2	3	4
300	Mechanical Seal Cartridge	1	1	2	2	3	3	4
952	Bearing Support	1	1	2	2	3	4	5
952	Bearing Main	1	1	2	2	3	4	5
881	O-ring Kit	4	6	8	8	9	10	10
882	Seal Sleeve Kit	1	1	2	2	2	3	4

9. Troubleshooting

Introduction

Follow these guidelines when troubleshooting the pump:

- Disconnect and lock out the power supply except when conducting checks that require voltage.
- Make sure that no one is near the pump when the power supply is reconnected.
- When troubleshooting electrical equipment, use the following:
Universal instrument multimeter, Test lamp (continuity tester), Wiring diagram

When pump does not start...

Cause	Remedy
An alarm signal has been triggered on the control panel.	<p>Check that:</p> <ul style="list-style-type: none"> · The impeller rotates freely. · If the sensor indicator indicates an alarm. · The overload protection is not tripped. <p>If the problem still persists: Contact the local K-Hydro's service shop.</p>
The pump does not start automatically, but can be started manually	<p>Check that:</p> <ul style="list-style-type: none"> · The start level regulator is functioning. Clean or replace if necessary. · The thermal protector have not opened. · All connections are intact. · The relay and contact coils are intact. · The control switch (Man/Auto) makes contact in both positions.
The installation is not receiving voltage	<p>Check that:</p> <ul style="list-style-type: none"> · The main power switch is on. · There is control voltage to the start equipment. · The fuses are intact. · There is voltage in all phases of the supply line. · All fuses have power and that they are securely fastened to the fuse holders. · The overload protection is not tripped. · The motor cable is not damaged.
The impeller is stuck.	<p>Clean:</p> <ul style="list-style-type: none"> · The impeller · The sump in order to prevent the impeller from clogging again.

If the problem persists, contact the local K-Hydro's service shop. Always state the serial number of your pump when you contact K-Hydro, see Product Description (page 16).



The pump does not stop when a level sensor is used

Always disconnect and lock out power before servicing to prevent unexpected startup. Failure to do so could result in death or serious injury.

Cause	Remedy
The pump is unable to empty the sump to the stop level.	Check that: <ul style="list-style-type: none">· There are no leaks from the piping and/or discharge connection.· The impeller is not clogged.· The non-return valve(s) are functioning properly.· The pump has adequate capacity. For information: Contact the local K-Hydro service shop.
There is a malfunction in the level sensing equipment.	<ul style="list-style-type: none">· Clean the level regulators.· Check the functioning of the level sensors.· Check the contactor and the control circuit.· Replace all defective items.
The stop level is set too low.	Raise the stop level.

If the problem persists, refer to the K-Hydro Service Guide on the web or contact the local K-Hydro service shop. Always state the serial number of your pump when you contact K-Hydro, see Product Description (page 16).



Always disconnect and lock out power before servicing to prevent unexpected startup. Failure to do so could result in death or serious injury.

The pump starts-stops-starts in rapid sequence

Cause	Remedy
The pump starts due to back-flow which fills the sump to the start level again	Check that: <ul style="list-style-type: none"> · The distance between the start and stop levels is not too small. · The non-return valve(s) work(s) properly. · The rinser is not too long without a non-return valve.
The self-holding function of the contactor malfunctions.	Check that: <ul style="list-style-type: none"> · The contactor connections. · The voltage in the control circuit in relation to the rated voltages on the coil. · The functioning of the stop-level regulator. · Whether the voltage drop in the line at the starting surge causes the contactor's self-holding malfunction.

If the problem persists, refer to the K-Hydro Service Guide on the web or contact the local K-Hydro service shop. Always state the serial number of your pump when you contact K-Hydro, see Product Description (page 16).

The pump runs but the motor protection trips

Cause	Remedy
The motor protection is set too low.	Set the motor protection according to the data plate.
The impeller is difficult to rotate by hand.	<ul style="list-style-type: none"> · Clean the impeller. · Clean out the sump. · Check that the impeller is properly trimmed.
The drive unit is not receiving full voltage on all three phases	<ul style="list-style-type: none"> · Check the fuses. Replace fuses that have tripped. · If the fuses are intact, notify a certified electrician.
The phase currents vary, or they are too high.	Contact the local K-Hydro service shop.
The insulation between the phases and ground in the stator is defective.	<ol style="list-style-type: none"> 1. Use an insulation tester. With a 1000V DC megger, check that the insulation between the phases and between any phase and ground is > 10 MΩ. 2. If the insulation is less, contact the local K-Hydro's service shop.
The density of the pumped fluid is too high.	Make sure that the maximum density is 9.2 lb/US gal (1100 kg/m ³). <ul style="list-style-type: none"> • Change the impeller or to a more suitable pump.
There is a malfunction in the overload protection.	Replace the overload protection.

If the problem persists, refer to the K-Hydro Service Guide on the web or contact the local K-Hydro service shop. Always state the serial number of your pump when you contact K-Hydro, see Product Description (page 16).

The pump delivers too little or no water

Cause	Remedy
The impeller rotates in the wrong direction.	<ul style="list-style-type: none"> · If it is a 3-phase pump, transpose two leads. · If it is a 1-phase pump, contact the local K-Hydro service shop.
One or more of the valves are set in the wrong positions.	<ul style="list-style-type: none"> · Reset the valves that are set in the wrong position. · Replace the valves, if necessary. · Check that all valves are correctly installed according to media flow. · Check that all valves open correctly.
The impeller is difficult to rotate by hand.	<ul style="list-style-type: none"> · Clean the impeller. · Clean out the sump. · Check that the impeller is properly trimmed.
The pipes are obstructed.	Clean out the pipes to ensure a free flow.
The pipes and joints leak.	Find the leaks and seal them.
There are signs of wear on the impeller, pump, and casing.	Replace the worn parts.
The liquid level is too low.	<ul style="list-style-type: none"> · Check that the level sensor is set correctly. · Depending on the installation type, add a means for priming the pump, such as a foot valve.
<p>If the problem persists, refer to the K-Hydro Service Guide on the web or contact the local K-Hydro service shop. Always state the serial number on the nameplate of your pump when you contact K-Hydro, see Product Description (page 16).</p>	
<p>Always disconnect and lock out power before servicing to prevent unexpected startup. Failure to do so could result in death or serious injury.</p>	



10. Technical Reference

Application Limit

The H-series submersible pumps are originally designed for pumping of unscreened wastewater in municipal and industrial installations and for low to medium density sludge pumping in sewage treatment plants. The pumps are also suitable for various raw water pumping duties where the conditions call for submersible pumps to be installed. Different pump material specifications are available for use in corrosive liquids.

Data	Description
Liquid temperature	104°F (40°C) maximum Warm-liquid version (only with cooling jacket): 158°F (70°C) maximum Explosion-proof pumps: 104°F (40°C) maximum
Liquid density	1100 kg/m ³ (9.2 lb per US gal) maximum
pH of the pumped liquid	5.5~14
Depth of immersion	164 ft (50 m) maximum
Storage temperature	-4~122°F (-20~50°C)
Other	For the rated current, voltage, power output and speed of the pump, see the nameplate or technical specification of the pump.



Usage of the pumps in installations where conditions exceed those allowed in the pump specifications may lead to pump malfunction and damage.

Motor Data

Feature	Description
Motor type	Squirrel-cage induction motor
Frequency	60 Hz
Supply	3-phase
Starting method	Standard: Direct on-line Optional: Star-delta
Maximum starts per hour	20 evenly spaced starts per hour
Code compliance	IEC 60034-30
Rated output variation	±10%
Voltage variation without overheating	±10%, provided that it does not run continuously at full load.
Voltage imbalance tolerance	2%
Stator insulation class	Standard: H (180°C [356°F])