

OPERATION AND MAINTENANCE MANUAL

# QIS SERIES

INTERNAL BALANCED  
MECHANICAL SEAL  
CENTRIFUGAL PUMP



02-11

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## Thank you for purchasing a Q-Pumps product.

This manual contains installation, operation, cleaning and maintenance instructions for the QIS Series.

It also includes a part list as well as a troubleshooting chart to assist in determining pump malfunction and practical advices for the maintenance and operation of the equipment.

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## ABOUT THIS MANUAL

To ensure the best performance of your pump, please read this manual before starting it. You will find useful information and instructions for the assembly and disassembly procedures required for the necessary pump maintenance.

For any questions related to the operation, maintenance or installation, please contact your local distributor or directly to Q-Pumps:

Q-Pumps S.A. de C.V.  
Acceso A # 103 Fracc. Industrial Jurica  
Querétaro, Qro. Mexico. 76130  
Call: +52 (442) 103 31 00  
**For Technical support contact:**  
support@qpumps.com  
**For Sales support contact:**  
sales@qpumps.com

The information in this manual might change without notice, we recommend visiting our website for any updates.

### Q-Pumps S.A. de C.V. Warranty

Q-Pumps guarantees that all manufactured and sold products are free from defects in materials and manufacture for a period of one (1) year from the date of shipment. The warranty does not apply to products which require repair or replacement due to what is considered normal wear. Conditions caused by normal wear include (but are not limited to standard rotors wear) casing, mechanical seals, gears and bearings wear.

Accidents, operating errors or improper maintenance are not covered by the warranty. Q-Pumps assumes no liability for incidental, accidental or consequential damages. The purchaser by acceptance of delivery assumes all liability for the consequences of use or misuse by it, its employees or third parties. Unless they are approved in advance, Q-Pumps does not assume any costs related to parts and / or service.

Q-Pumps disclaims any responsibility for modifications or conversions to the pump and the system. For security reasons and functionality use original parts only. The use of other parts voids the warranty and excludes liability for any consequences.

The pump is designed only for pumping fluids under established characteristics in the selection sheet. Any other use besides the intended one without the prior written consent of the manufacturer's application, will result in disclaim of any responsibility from Q-Pumps.

If the pump is stored temporarily or indefinitely, avoid weather exposure and protect the connection ports with plastic plugs supplied with your pump. Turn the pump shaft by hand every two months to change the rotating position of the bearings.

## SAFETY

### IMPORTANT SAFETY INFORMATION

**DO NOT attempt to modify any Q-Pumps product**, the QIS series centrifugal pumps have been designed to be safe and reliable, to do so could create unsafe conditions and void all warranties.

**DO NOT place any Q-Pumps product in an application where general product service ratings are exceeded.** If the maintenance and operation personnel do not observe the instructions in this manual could result in personal injury or machine damage.

The following **DANGER**, **WARNING**, and **CAUTION** signs and their meanings are used within these instructions to avoid serious injury and/or possible damage to equipment.

	<b>DANGER</b>
Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. The word danger is used in the most extreme cases.	

	<b>WARNING</b>
Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. May also be used to alert against an unsafe operating or maintenance practice.	

	<b>CAUTION</b>
Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.	

**CODE 136530001**  
(Rotating direction ccw)



**CODE 136530002**  
(Guard warning)

<b>WARNING</b>
<b>ROTATING SHAFT</b>
<b>DO NOT OPERATE WITHOUT GUARD IN PLACE</b>

Safety labels are placed on every pump. **DO NOT remove** any labeling on any Q-Pumps product. Replace any label that is missing.

# INSTALLATION

## DESCRIPTION

	<b>⚠ WARNING</b>
	Before servicing pump, disconnect electrical power source, carefully relieve all pressure and drain all fluids from pump and connected piping.

**Before servicing pump, disconnect electrical power source.**

The QIS series closed-coupled pumps are made up of two sections, power or drive section and the liquid end or pump section.

The pump is mounted to the frame of the drive motor by means of an adapter and is coupled to the motor shaft. The impeller mounts on the stub shaft and is retained by one of the three methods. The casing is fixed to the adapter with screws allowing to position the discharge outlet at 0°, 45° and 90°. The internal, balanced mechanical seal (single or double) assures long seal life. The drive motor is mounted on a frame having adjustable legs providing simple installation and leveling.

## INSTALLATION GUIDELINES

### UNPACKING EQUIPMENT

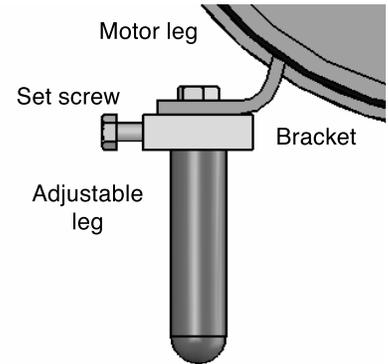
Check the contents and all wrapping when unpacking your equipment. Inspect all parts for damage that may have occurred during shipping. Report any damage to the carrier.

### LOCATION AND INSTALLATION

The pump unit should be located as near as possible to the liquid source and in a position where the suction piping can be short and direct with a minimum number of elbows and fittings. It should also be readily accessible for inspection and cleaning.

The pump unit, as received from the factory, is ready for installation. To install it, attach a hoist if necessary, loosen the set screws in the adjusting leg brackets, and individually adjust the legs until the pump is leveled. Tighten the set screws.

Attach the suction and discharge piping. Be sure suction and discharge piping is properly supported to avoid any strain on the pump casing.



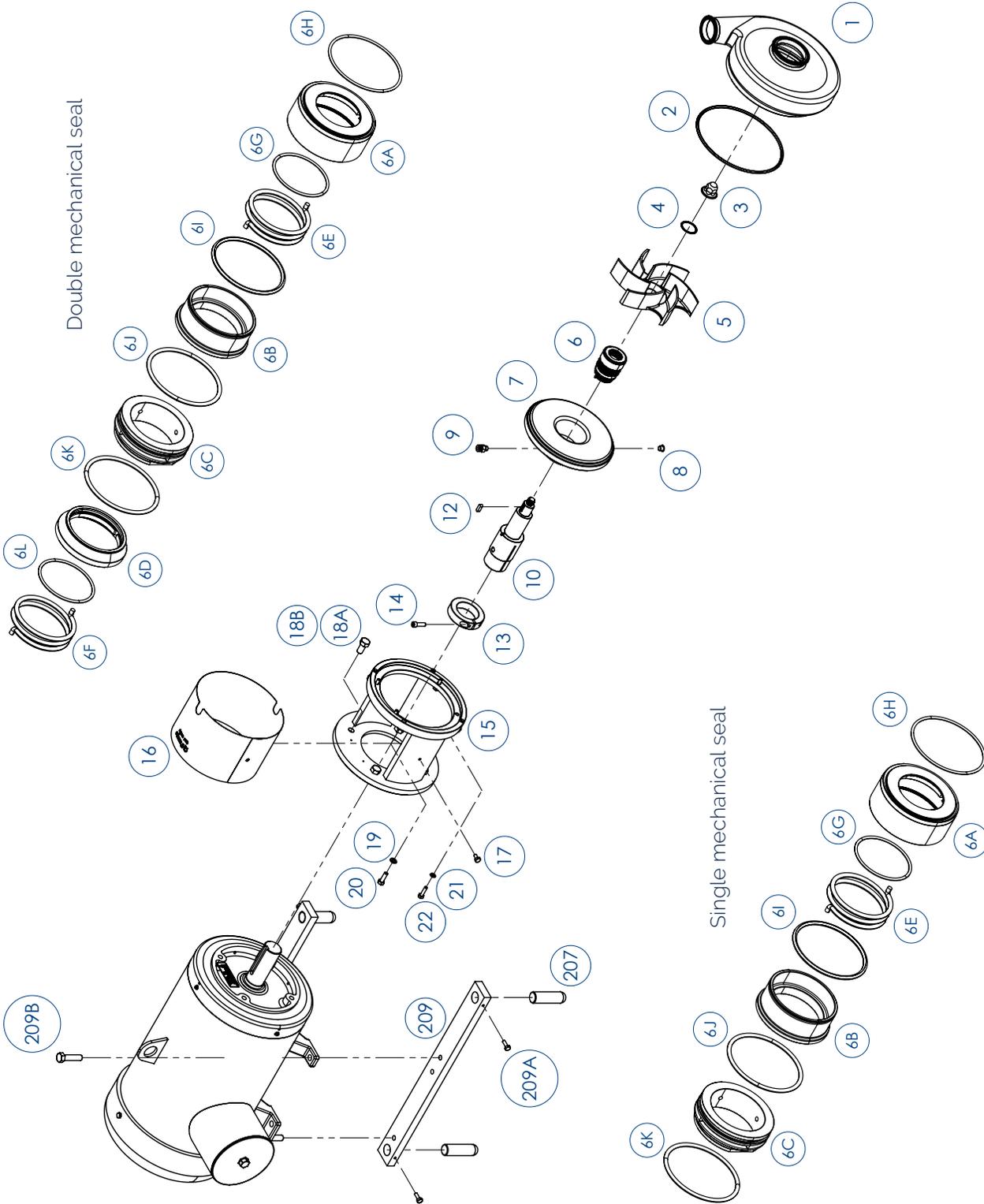
## ASSEMBLY PRELIMINARIES

	<p style="text-align: center;"><b>⚠ WARNING</b></p> <p>Before servicing pump, disconnect electrical power source, carefully relieve all pressure and drain all fluids from pump and connected piping.</p>
--	---

Before beginning the assembly procedure identify every element that is going to be installed, you can use the exploded view and part list shown in pages 7 and 8. During the assembly you may need the following tools:

1. 1", 3/4", 9/16" and 1/2" Wrenches.
2. 3/16" and 1/4" Allen wrenches.
3. Rubber mallet.
4. Shims with different thicknesses: 0.005", 0.010" and 0.020".
5. Ratchet handle and sockets 5/8" and 7/8", – for impeller nut.
6. 3/8" diameter steel rod – to avoid the stub shaft from turning.
7. Torque Wrench.

# QIS GENERAL DIAGRAM



## QIS PART LIST

ITEM	DESCRIPTION	QTY
<b>1</b>	Casing	1
<b>2</b>	Casing o-ring	1
<b>3</b>	Impeller nut plus	1
<b>4</b>	Impeller nut gasket	1
<b>5</b>	Impeller QIS	1
<b>6</b>	Mechanical seal	1
<b>6A</b>	Rotary holder	1
<b>6B</b>	Internal rotary face	1
<b>6C</b>	Static face	1
<b>6D</b>	External rotary face	1
<b>6E</b>	Internal rotary spring	1
<b>6F</b>	External rotary spring	1
<b>6G</b>	O-ring rotary holder	1
<b>6H</b>	O-ring rotary holder	1
<b>6I</b>	O-ring internal rotary face	1
<b>6J</b>	O-ring static face front	1
<b>6K</b>	O-ring static face back	1
<b>6L</b>	O-ring external rotary face	1
<b>7</b>	Backplate	1
<b>8</b>	Plug	2
<b>9</b>	Flush double seal	2

ITEM	DESCRIPTION	QTY
<b>10</b>	Stubsahft	1
<b>12</b>	Stubshaft key	1
<b>13</b>	Stubshaft collar	1
<b>14</b>	Collar bolt	1 OR 2
<b>15</b>	Adapter	1
<b>16</b>	Adapter guard	1
<b>17</b>	Adapter guard bolt	1
<b>18A</b>	Adapter hexagonal screw	4
<b>18B</b>	Adapter hexagonal nut	4
<b>19</b>	Washer	4
<b>20</b>	Casing hexagonal screw	4
<b>21</b>	Washer	4
<b>22</b>	Backplate hexagonal screw	4
<b>207</b>	Leg	4
<b>209</b>	Leg bracket	2
<b>209A</b>	Leg hexagonal screw	4
<b>209B</b>	Leg bracket hexagonal screw	4
<b>209B</b>	Leg bracket hexagonal screw	4

# ASSEMBLY

## START THE ASSEMBLY

It is highly recommended that you use the general diagram to identify the components and thus be able to carry out the assemblies and sub-assemblies that will be explained below.

### 1. LEG BRACKET ASSEMBLIES

The leg bracket assemblies are optional. They allow to level the pumps adjusting the legs vertically. The size of the brackets (209) and legs (207) depend on the NEMA or IEC motor frame.

First make the sub-assemblies of the legs to the brackets with the hexagonal screws (209A). Next, with the hexagonal screws (209B) fix the brackets to the motor base; You may need to lift the motor to make this assembly. Figure A.

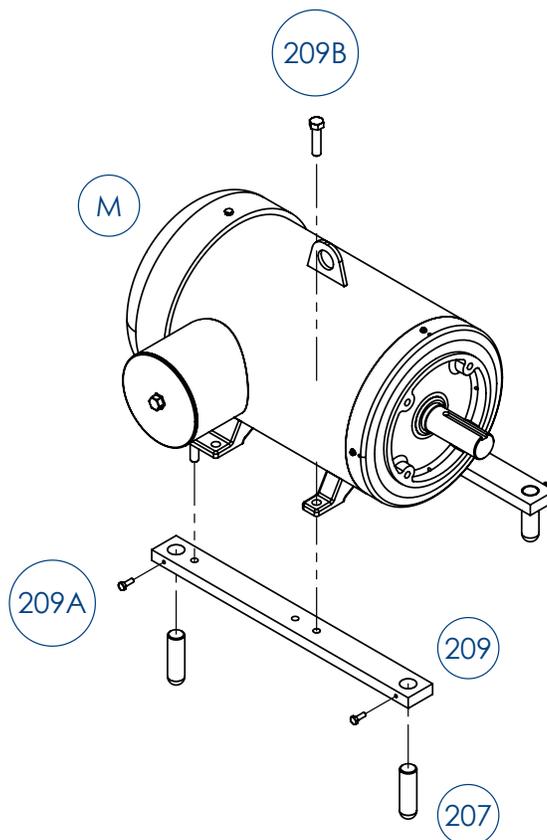


Figure A

## 2. ASSEMBLY THE ADAPTER TO THE MOTOR

Place the stainless adapter (**15**) on the motor flange and fix it with hexagonal screws and tighten to the torque values recommended in chart 1.

Table 1 – Torque values for tightening the adapter screws		
Torque ft-lb	Models NEMA	Models IEC
55	Frame 18 to 25	Frame 110 to 160
70	Frame 28	Frame 180
110	Frame 32 to 36	Frame 200 to 225

For NEMA motors "C" face use the four hexagonal screws (**18A**). Figure B.

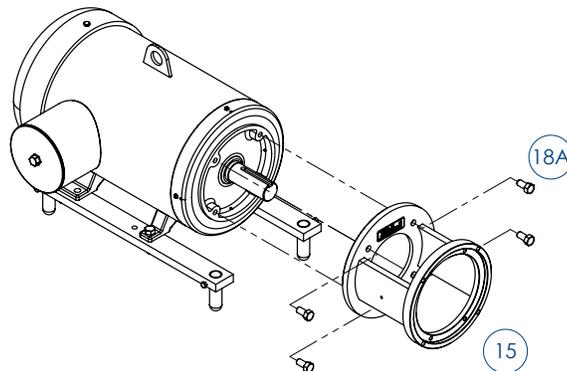


Figure B

For IEC motors "FF" face (B5 flange) use the four hexagonal screws (**18A**) and the hexagonal nuts (**18B**).

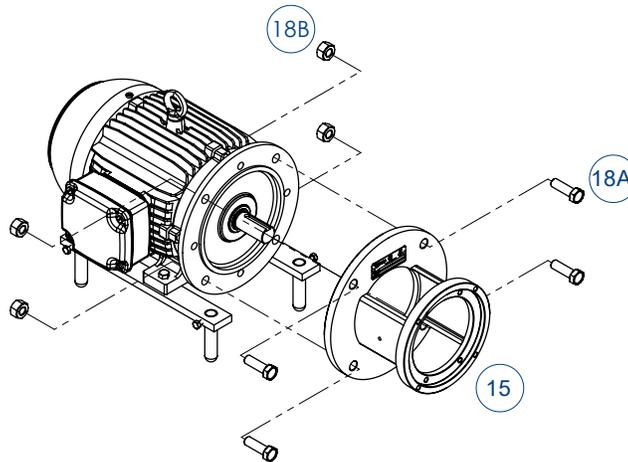


Figure C.

### 3. SPACING OF THE IMPELLER AND STUB SHAFT

The correct operation of the pump depends on the separation of the impeller from the backplate and the fixation of the stub shaft on the motor shaft. Follow the next steps to fix the stub shaft on the motor shaft:

**3a.** Position the stub shaft collar (13) with the corresponding Allen screws (14) loosely on the stub shaft (10) and place it on the motor shaft, it must slide in and out without problem. Figure D.

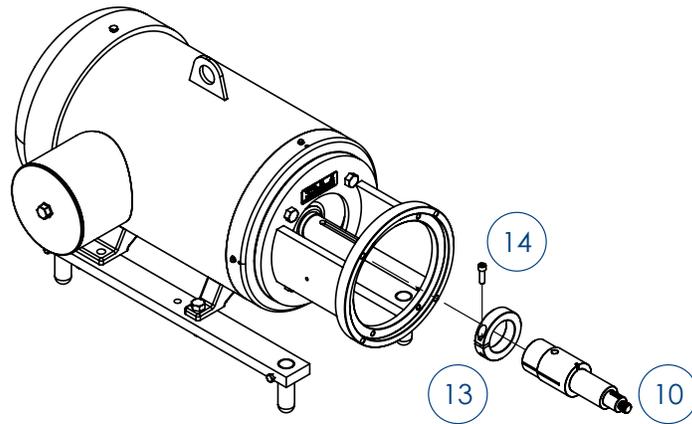


Figure D

**3b.** Place and fix the backplate (7) into the adapter using the four hexagonal screws (22) and washers (21). The orientation of the backplate is with the flushing holes in a vertical position; the flushes are used only for double mechanical seal. The backplate has a square shape in the back to keep the mechanical seal static face in place. Figure E.

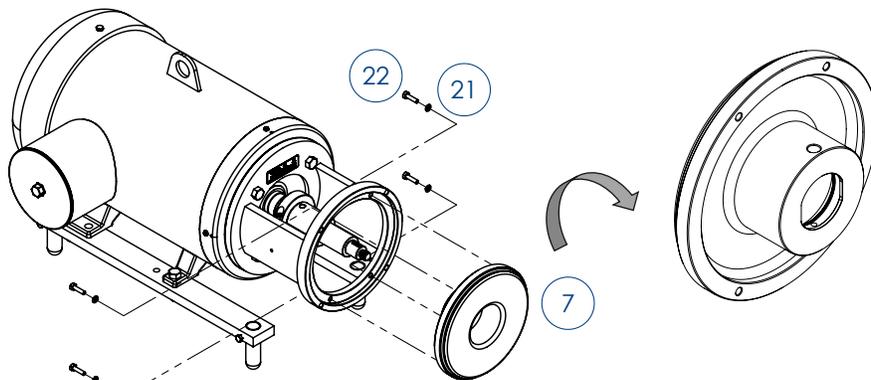


Figure E

**3c.** Now place only the rotary holder of the mechanical seal (**6A**) together with its respective O-ring (**6H**) until it seats on the shoulder of the stub shaft. Put the impeller key (**12**) on the keyway of the stub shaft. The impeller key does not interfere with the mechanical seal drive collar.

Take the impeller nut (**3**) and place the impeller gasket (**4**) on it, then place the impeller (**5**) in the stub shaft and tighten with the impeller nut compressing the assembly. Figure **F**.

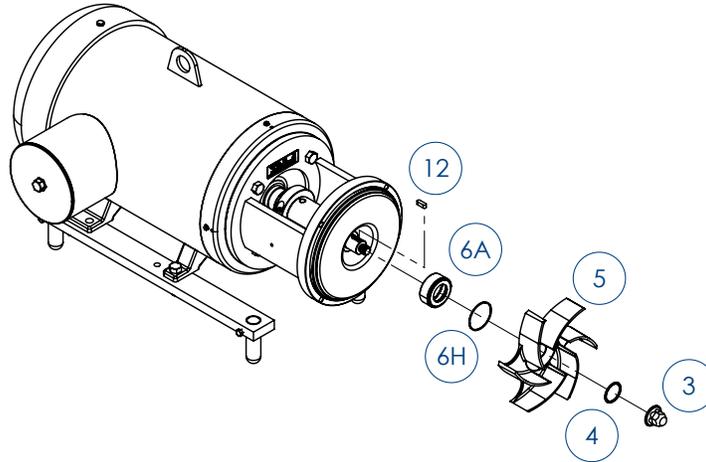


Figure F

Use a **5/8"** hexagonal socket for models **114** and **214** and a **7/8"** hexagonal socket for the rest of models to tighten the nut.

To prevent the stub shaft-impeller assembly from turning you can use a **Ø3/8"** rod in the bore that has the stub shaft on its side and thus be able to tighten or loosen the impeller nut. Figure **G**.

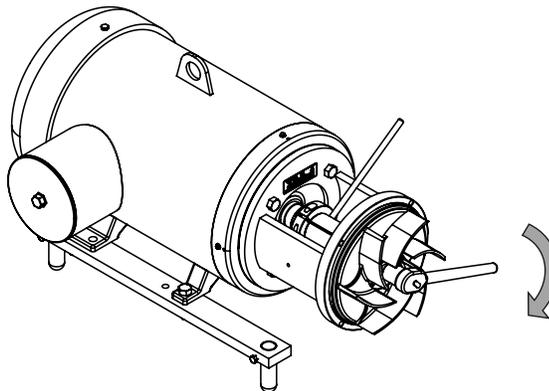


Figure G

Remember that you can use water or dishes soap to lubricate or glue O-rings and gaskets to the metal elements to facilitate assembly.

**3d.** Once the assembly is tightened place a shim of **0.025" (0.63 mm)** or **0.030" (0.76 mm)** between the back of the impeller and the front of the backplate. You may use a caliper or some shims to set the critical distance for the correct performance of the mechanical seal. Keep aligned both, the stub shaft slot, and the collar slot before tightening the screw (or screws) on the shaft collar. Compress the impeller against the backplate with the shim between them and proceed to tighten the screw or screws on the shaft collar. Use the torque values for tightening the collar screws indicated in the chart 2. Figure H.

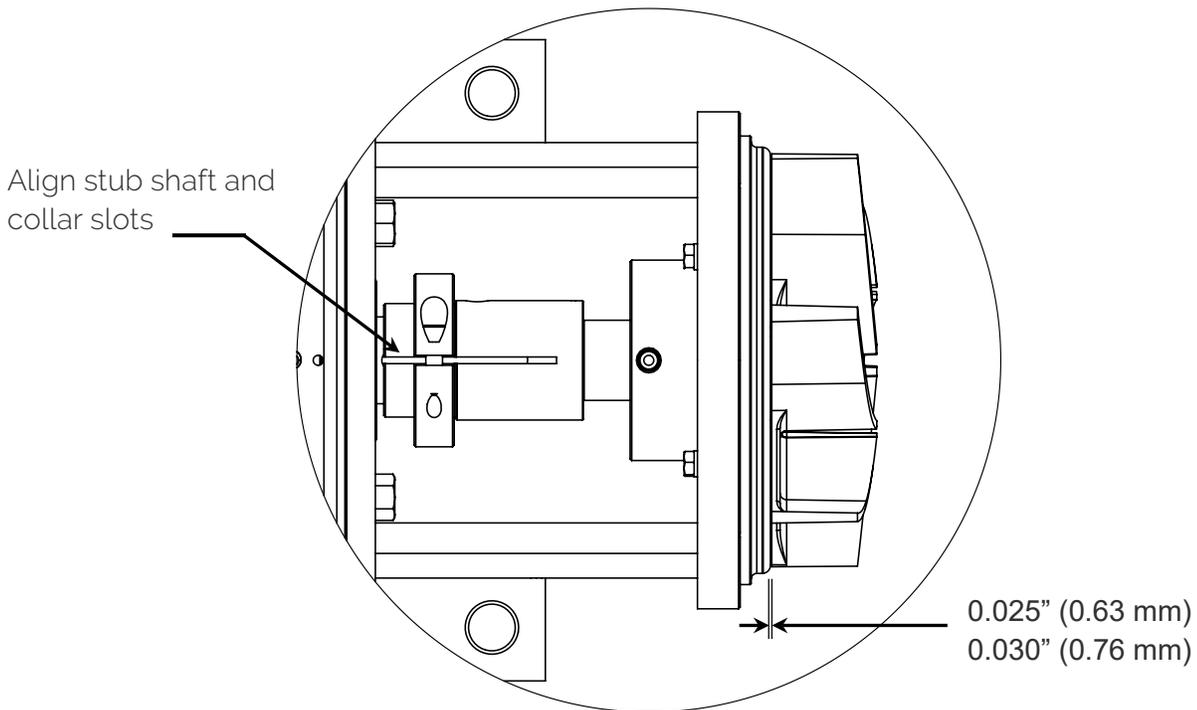


Figure H

Table 2 – Torque values for stub shaft collar Allen screws		
Torque ft-lb	Models NEMA	Models IEC
13	Frame 56 to 18	Frame 80 to 112
30	Frame 21 to 25	Frame 132 to 160
35	Frame 28 to 32	Frame 180 to 225

Now turn the impeller by hand, it must turn without restriction. Check that every vane is separated the distance indicated.

**3e.** Using the **3/8"** rod and the hexagonal socket and wrench to loosen the impeller nut to remove the elements previously assembled.

Take the impeller nut, impeller gasket, impeller and impeller key off. Do not forget to remove also the shim used to determinate the stub shaft position. Finally remove the backplate and continue assembling the mechanical seal (6). Figure I.

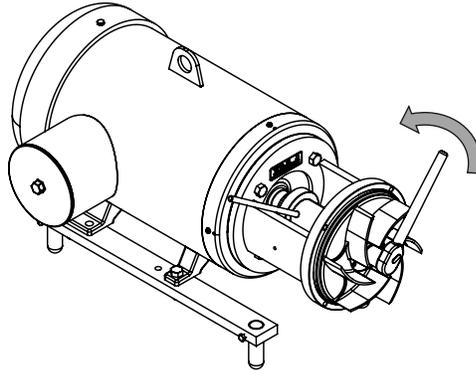


Figure I

#### 4. ASSEMBLING THE MECHANICAL SEAL

**4a. External seal sub-assembly, double mechanical seal.** For double mechanical seal only, insert the O-ring (6L) into the external rotary face (6D), then locate the external spring (6F) inside the external rotary face. Be sure the spring tip fits in the notch on the rotary face. Now, slide the subassembly into the stubshaft; the other spring tip must fit in the notch on the stubshaft. Prepare the single seal items to assembly following the next steps. Figure J.

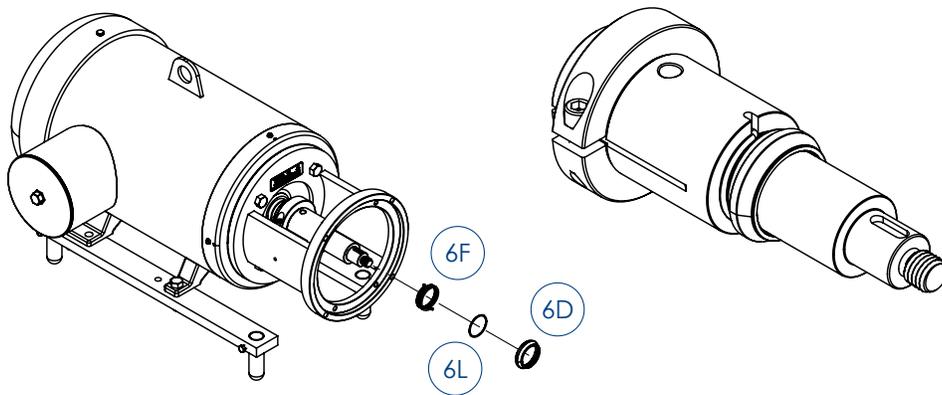


Figure J

Note that the internal and the external springs are interchangeable.

**4b. Static face sub-assembly, single and double mechanical seal.** Place into the backplate (7) the stationary face of the mechanical seal (6C) with its O-rings (6J & 6K). First place the O-rings on

the stationary face; the static face has a gutter in the middle between both O-rings, do not block this, and remember that you can use water or dishes soap to lubricate or glue O-rings and gaskets to the metal elements to ease assembly. Place the stationary face into the backplate seal housing, the square shape in both parts must be aligned. Push until the seal surface fully seats on the housing. Figure K.

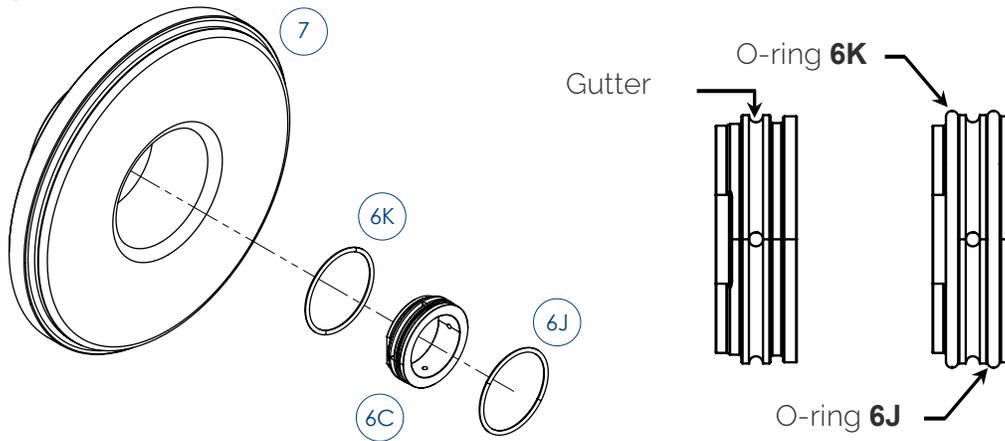


Figure K

Place and fix the backplate already with the stationary seal installed into the adapter as in step 3b. Use torque value to fix the backplate of **6 ft.lb** for all the models. Be careful not to hit the seal with the stubshaft end.

**4c. Internal rotary seal sub-assembly, single and double mechanical seal.** Assemble the internal rotary face (6B), the rotary seal O-ring (6I), internal spring (6E) and rotary holder O-ring (6H) into the rotary holder (6A). First place the O-ring (6I) into the groove on the rotary holder. Then place the spring inside the rotary holder taking care the spring tip fits the notch in the rotary holder. Insert the internal rotary face into the rotary holder. The second spring tip must fit the notch in the internal rotary face, then compress. Finally place the rotary holder O-ring (6H) in the groove on the front of the holder. Figure L.

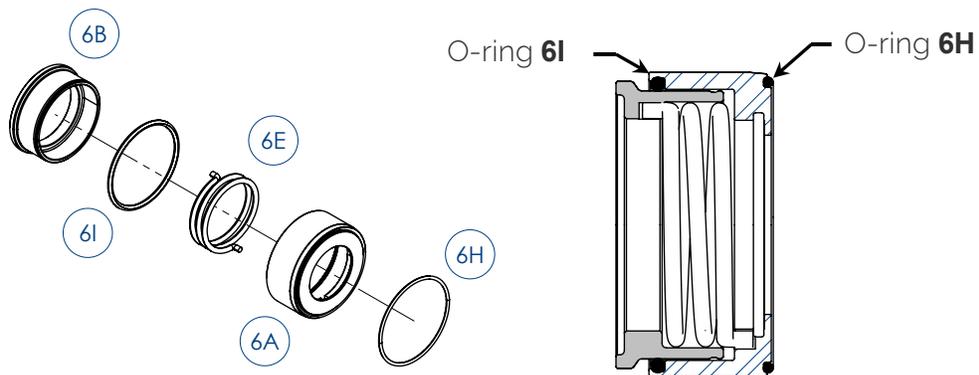


Figure L

**4d.** For double mechanical seal it is necessary to add the inside O-ring (**6G**); place it into the rotary holder (**6A**) before placing the spring inside the rotary holder. Figure **M**.

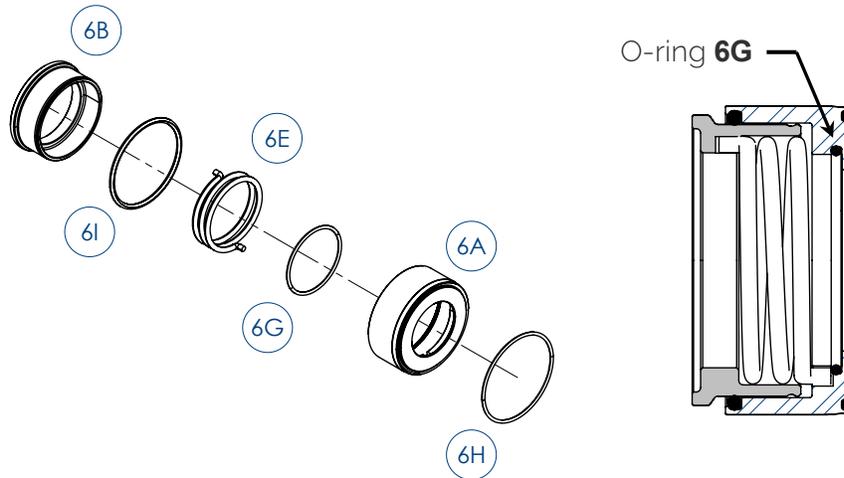


Figure **M**

**4e.** Now, Insert the whole rotary seal sub-assembly into the stub shaft. The seal will contact the stationary seal face placed previously in the backplate (step **4a**). Push to compress the assembly and then insert the impeller key, put the impeller and tight it with the impeller nut. Do not forget to place the impeller gasket into the impeller nut.

Tight the assembly as previously did before in step **3c**. For models **114** and **214** use a torque of **25 ft.lb** and a torque of **40 ft.lb** for the rest of the models. Figure **N**.

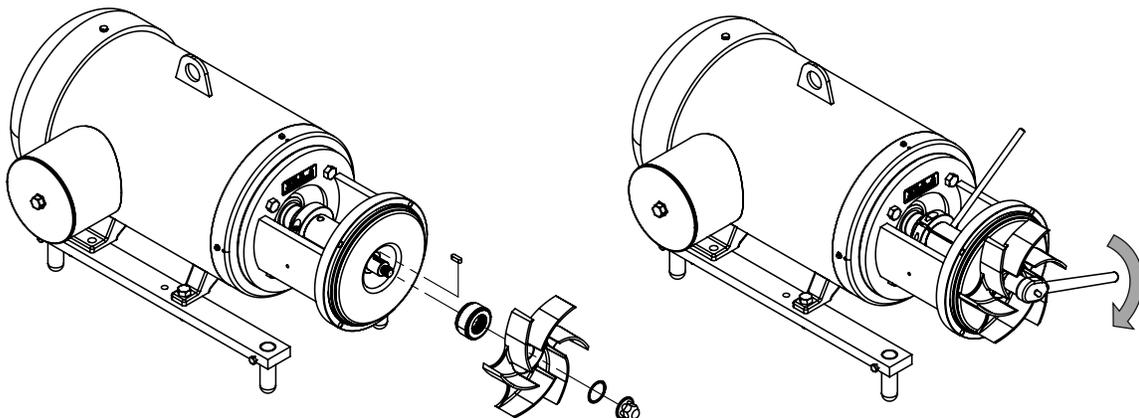


Figure **N**

**4f.** For single mechanical seal do not forget to install the plugs (**8**) on the flush holes as protection and for double mechanical seal do not forget to install the flush nipples (**9**) on the flush holes; use a pressure around the **5-psi** (ideal) to **15 psi** (maximum) for the lubrication of double mechanical seal only. Figure **O**.

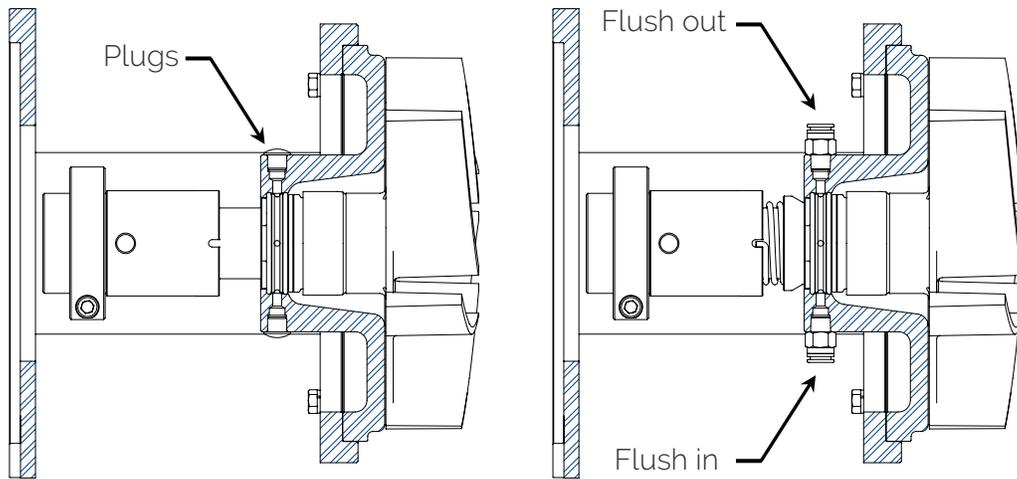


Figure **O**. Single & double mechanical seal assemblies

## 5. ASSEMBLING THE CASING

**5a.** Once the mechanical seal has been installed and the impeller-impeller nut assembly has been tightened use the four hexagonal screws (**20**) and washers (**19**) to fix the casing. Place the casing O-ring (**2**) onto the groove on the front of the backplate. Then take the casing (**1**) and locate it onto the adapter, position the discharge at the desired location, vertical, 45° or horizontal. To fix the casing use a torque of **6 ft.lb** for models **114, 214, 216 & 316**, and a torque of **11 ft.lb** for models **218, 318, 328, 428, 4410 & 6410**. Figure **P**.

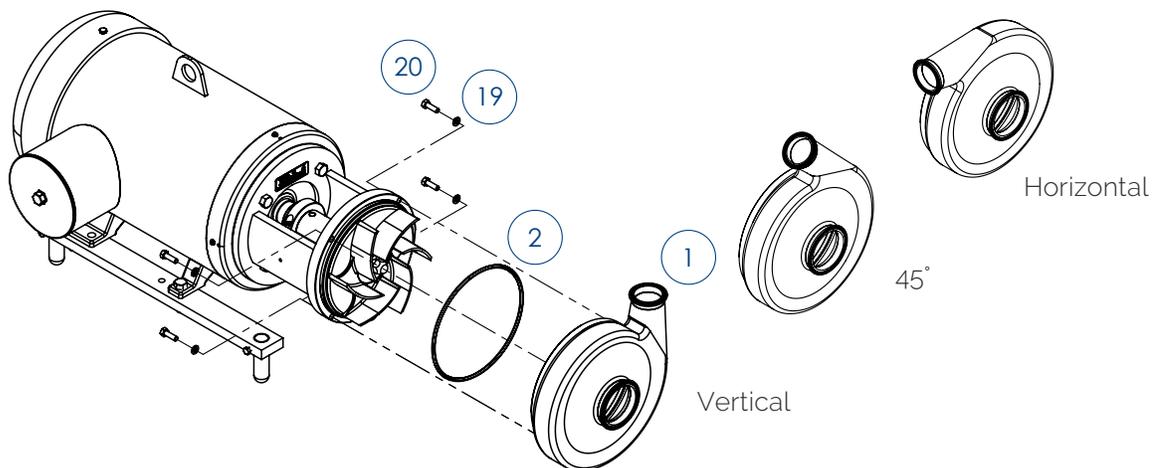


Figure **P**. Casing discharge orientation.

**5b.** Check turning by hand the impeller it does not rubs against the casing. The assembly may turn easily without restriction. If there is any sound or sensation of rubbing, you need to check the whole assembly, disassembly and repeat it again. If everything is fine, to complete the assembly place and fix the protective guard **(16)** with a hexagonal screw **(17)** onto the adapter. It is highly recommended for safety reasons not to operate the equipment if it is not placed in the adapter. Figure **Q**.

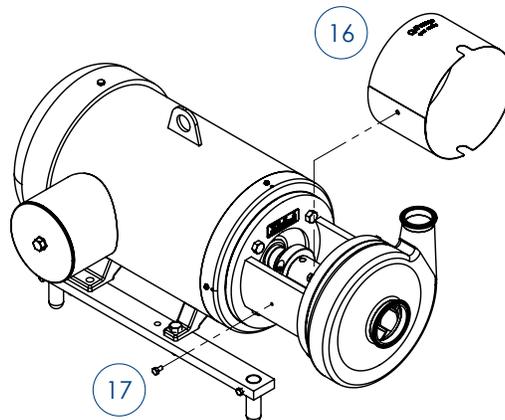


Figure Q

**5c.** Your assembly is complete. Figure **R**.

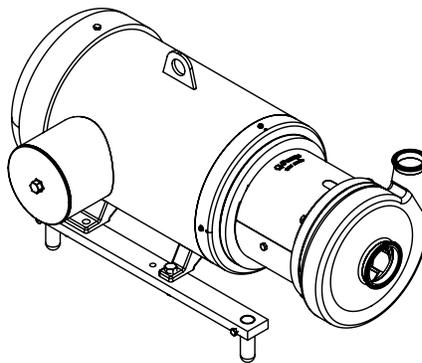


Figure R

**Notes:**

1. Before starting the pump check that the motor turns in a counterclockwise direction.
2. Keep the suction line flooded and the mechanical seal lubricated with the fluid which is going to be pumped. Never operate the pump when dry or it may damage the seal.
3. Every double mechanical seal must be lubricated with no exception.
4. Maintain enough NPSH available in the suction line to avoid the pump to cavitate.
5. Do not support the weight of the pipe on the pump casing, the pipe must be adequately supported to avoid this.

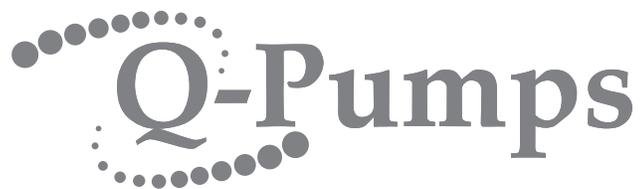


## QUICK GUIDE FOR SOLVING COMMON PROBLEMS

Q-Pumps products are relatively easy to maintain with the exception of the sanitary process. Just as with any other element of machining, problems may arise. This section offers a guide for identifying and correcting most of the pumping problems. For problems with you motor, contact the manufacturer directly for best assistance.

The following table illustrates the problems and probable causes, assuming that the pump was correctly selected for a specific application. If none of the listed solutions provided in the table resolves the problem, the most likely cause is cavitation. Cavitation may be caused by an incorrect pump selection and its symptoms include: excessive noise, insufficient pressure, fluid leak and vibration. If these symptoms are present, please re-evaluate your application.

<b>1. NO FLOW</b>	<b>SOLUTIONS</b>
a) Motor speed too low. b) Incorrect rotation direction. c) Obstruction in discharge piping or closed valves.	a) Check electric connections and motor. b) Reverse one of the motors three phases. If direction does not change, contact manufacturer. c) Remove obstruction and open valves.
<b>2. INSUFICIENT FLOW</b> a) Motor speed too low. b) Incorrect rotation direction. c) Obstruction in discharge piping or closed valves. d) Impeller damaged	a) Check electric connections and motor. b) Reverse one of the motors three phases. If direction does not change, contact manufacturer. c) Remove obstruction and open valves. d) Replace impeller
<b>3. EXCESSIVE POWER CONSUMPTION</b> a) Motor speed too high. b) Impeller damaged. c) Motor shaft is bended or worn.	a) Motor wires are bad, replace motor. b) Remove casing and replace impeller. c) Replace motor shaft.
<b>4. EXCESSIVE NOISE</b> a) Magnetic problem with motor. b) Motor bearings damaged. c) Foreign particles in impeller. d) Impeller damaged. e) Cavitation.	a) Consult motor manufacturer. b) Replace bearings. c) Remove casing and extract particles. d) Replace impeller. e) Check system's available NPSH. d) Cavitation.
<b>5. EXCESSIVE VIBRATION</b> a) Pump is not leveled. b) Impeller damaged. c) Piping lacks supports. d) Cavitation.	a) Level the pump. b) Replace impeller. c) Support suction and discharge piping. d) Check system's available NPSH.
<b>6. FLUID LEAK</b> a) Disposable o-rings. b) Disposable carbons. c) Insufficient seal compression. d) Damaged casing suction/discharge. e) Disposable casing gasket. f) Loose clamp assembly.	a) Replace o-rings. b) Replace carbons. c) Replace spring. d) Replace casing. e) Replace casing gasket. f) Tighten clamp assembly.



OPERATION AND  
MAINTENANCE MANUAL  
QIS SERIES

Internal Balanced Mechanical Seal,  
Centrifugal Pump

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