

# **Trisuria**

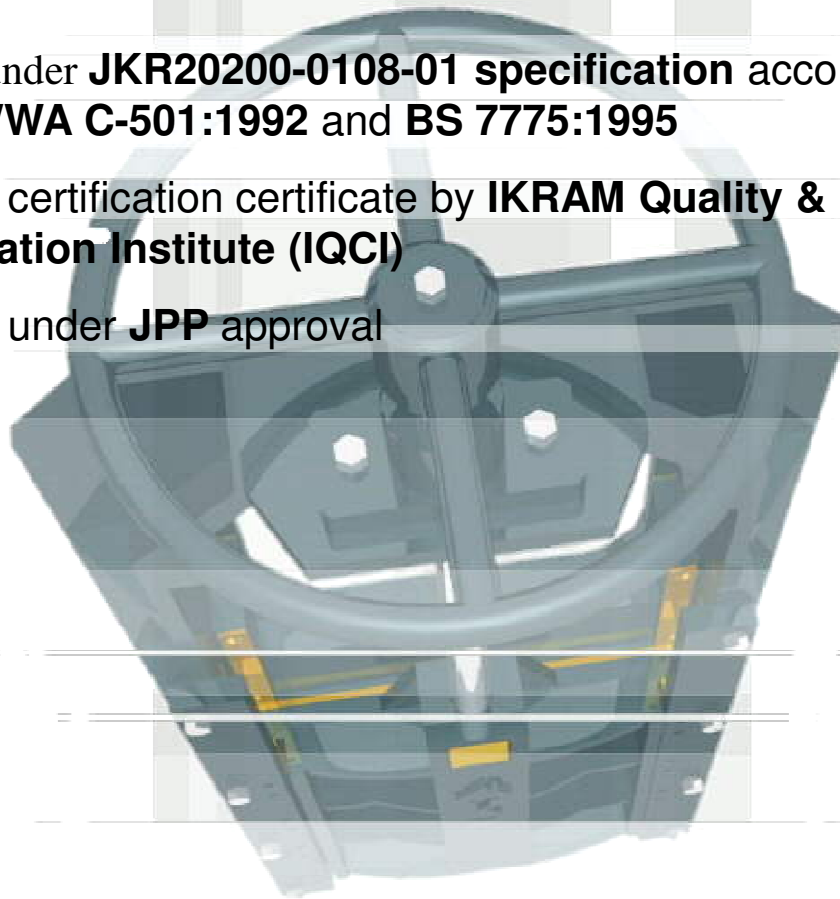
## **KT-PENSTOCK**

### **INSTALLATION MANUAL**

Design under **JKR20200-0108-01 specification** accordance with **AWWA C-501:1992** and **BS 7775:1995**

Product certification certificate by **IKRAM Quality & Certification Institute (IQCI)**

Product under **JPP** approval



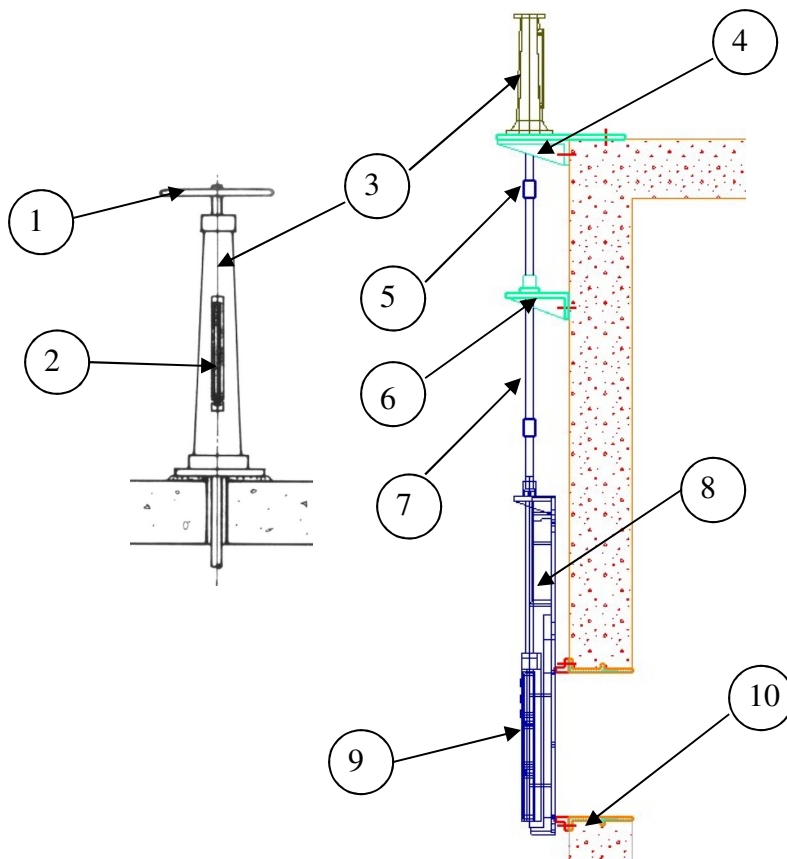
# Handling Method

## Introduction:

All the penstocks have been carefully designed, manufactured and assembly at factory. However, they must be handled, stored, and installed correctly in order to assure proper operation. Most penstock problems are caused by damage from handling, improper alignment and installation, or incorrect wedges adjustments.

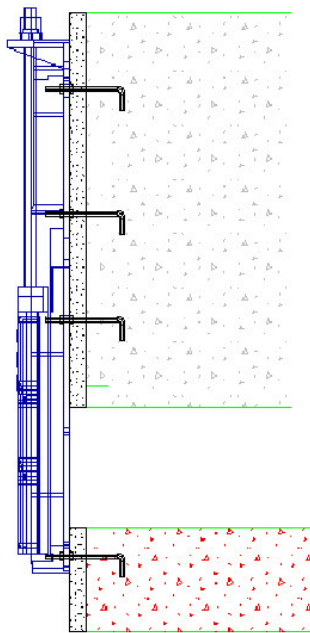
## Handling and Storage:

1. Make sure all handling equipment is properly sized and in good condition.
2. Make sure the wedges device is securely installed.
3. Never store penstock directly on the ground or one on top of another. Use wooden skids or timbers, and make an even surface to prevent possible distortion or warping of the gate. Avoid any damage to the precision machined surfaces.
4. The stem and threads can easily be damaged by bending, impact, or other improper handling or storage. Always protect them from impact and avoid bending during moving, storing and installing.
5. Protect the threads of the stems from dirt or other debris. A damaged or dirty stem will preclude proper operation of penstock.
6. Secure and protect the accessories supplied with the gate. Parts must be cover and prevent from damaged, destroyed, lost or stolen.

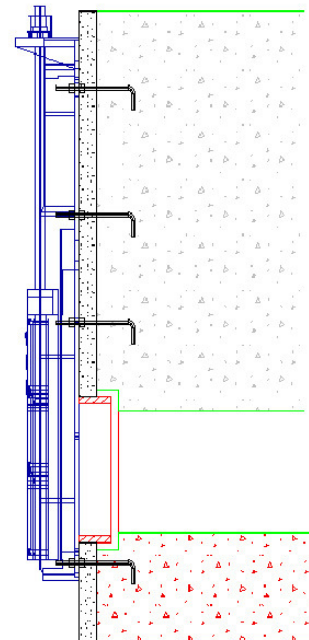


No.	Identification
1	Handwheel
2	Indicator
3	Headstock
4	Headstock Bracket
5	Muff Coupling
6	Stem Guide
7	Ext. Stem
8	Frame
9	Gate
10	Thimble

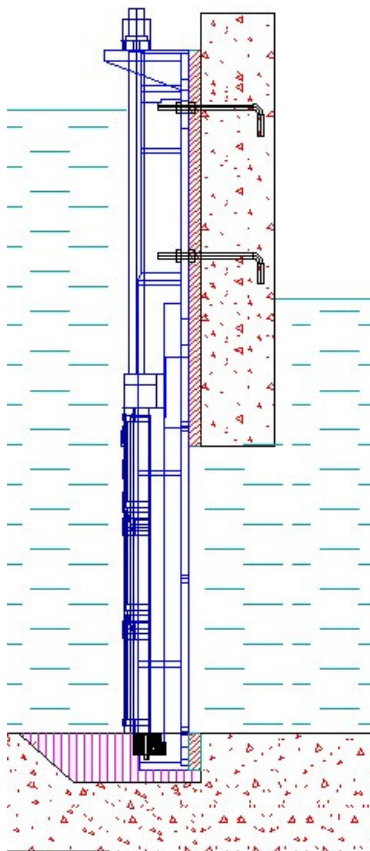
# TYPE OF PENSTOCK'S MOUNTED METHOD



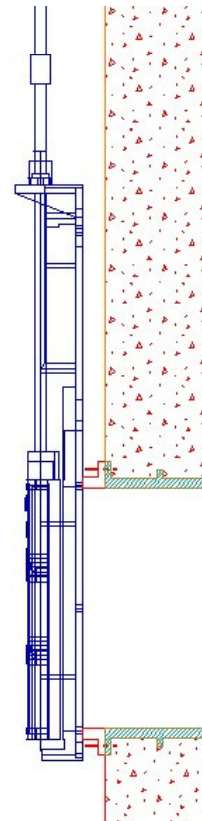
**Wall Mounted for Flat Back Type**



**Wall Mounted for Spigot Type**



**Flash Bottom Mounted Method**



**Thimble or Pipe Flanging Mounted Method**

# Penstock Installation Method

## New Headwall Installation Method

- Secure all anchor bolts in proper position in the forms, check the size, projection, and alignments conform to requirements shown in our illustration. Do not mount penstock to the misaligned bolts.
- Each bolt has been provided with 2 nuts for proper mounting of penstock. In setting the forms, provide a recess around the perimeter of the gate. Allowing easy adjustment of the back nut and make sure the sufficient grout space must be left for adjustment of the back nut.
- After concrete has been poured and form has been stripped, place one nut on the anchor bolt. Place the **completely assembly** penstock into position carefully. Place the second nut on the anchor bolt and bring bolt nuts into finger-tight contact with the penstock's frame, aligning it as necessary (Figure 1).
- Check the clearance between gate and frame by the 0.1mm feeler gauge. If find out some gaps, check to see if penstock has been warped during install. Adjust the nuts to bring the penstock into flatness. **Do not over tighten** the nut during installation. This will damage the penstock.
- After the penstock is properly set, grout in the space between frame and headwall using a non-shrink material. Check for voids carefully (Figure 2).
- Wait for the grout fully cure. Check the gate by 0.1mm feeler gauge. If OK, the penstock now is ready for initial operation.

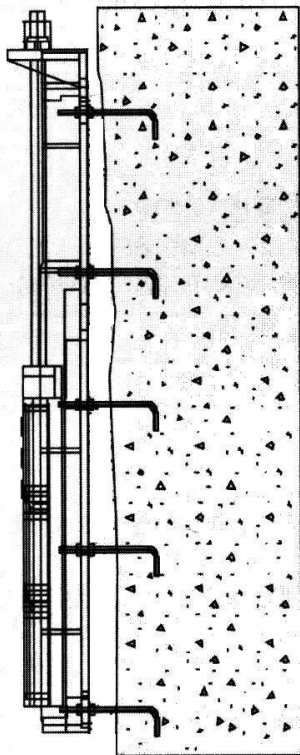


Figure 1, Penstock alignment using 2 nuts and J bolts

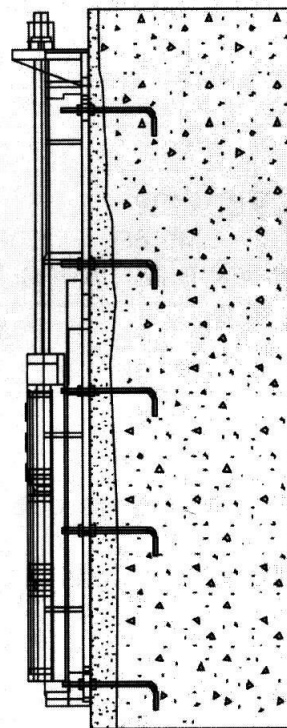
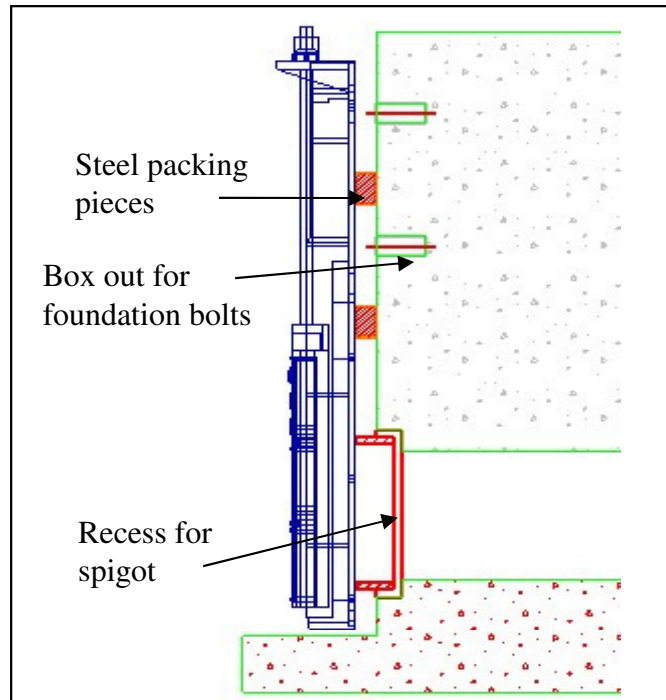


Figure 2, Wall grouting after Penstock is align.

# Penstock Installation Method

## Existing Headwall Installation Method

1. Box out the concrete foundation bolt and spigot end where applicable on request.
2. Mark the center line of the aperture onto the template, after that mark the frame bolt hole and then drill the hole from where it's mark.
3. Then, fix the wall plug or hammer capsules to the drilling position and then mount the template into the position by aligning the vertical and horizontal leveling.
4. When the template position is correct, fill the box out pocket with non shrink grout until it fully cure.
5. When the grout is fully cure, remove the template and penstock can be installed. Before mounting, a steel packing piece insert to all the bolt. These space allowance is for sealing purpose. When tightening of the bolts and nuts, special care to avoid over tightening of the nuts and best if apply even tighten force.
6. After penstocks has been mounted, check the alignment before sealing penstock wall gap. Check the door and frame faces with feeler gauge. Double check the bolts and nuts to make sure that the tightening is not over tight causing strain to the penstock frame. Finally, penstock frame gap can be sealed after finish the above checking procedurals. If all the recommended installation method are following, the penstock should be operate correctly without leakage problems.



## Wall Thimble or Pipe Flange Installation Method

1. Place the thimble in correct position in the forms and secure in place. Thimble should be flush or projecting slightly from the head wall face.
2. Use timbers or other bracing on the side of opening to support the thimble from prevent warpage. This is very important especially in large size of thimble or high concrete cover.
3. Plug the tapped holes to prevent the concrete from entering the holes. Secure the anchor bolts for penstock frame mounting as well.
4. Pour concrete by fully care, not to move thimble from original position.
5. Let concrete set, then remove the forms and bracing. Thoroughly clean the front machined face of thimble and place cleaned studs into tapped holes provided.
6. Clean the back of penstock frame. Apply a rubber gasket on the front face of thimble.
7. Mount the completely assembled gate on the thimble. Place nuts on studs and tighten uniformly.
8. Check clearance between seating surface with 0.1mm feeler gauge. Make the wedges adjustment if necessary. Penstock is now ready for initial operation.

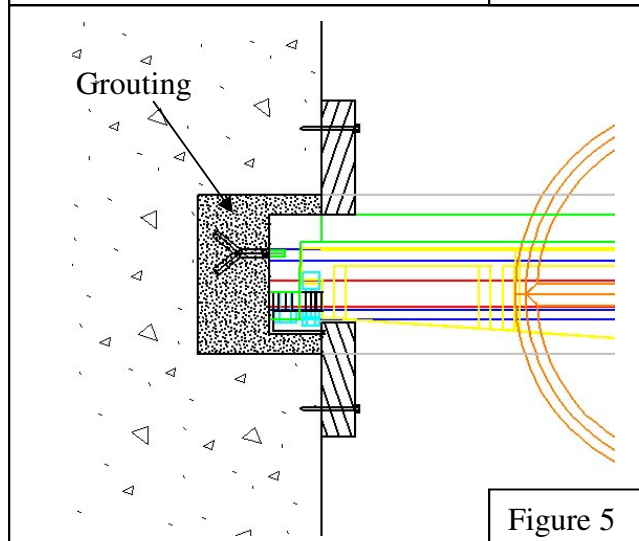
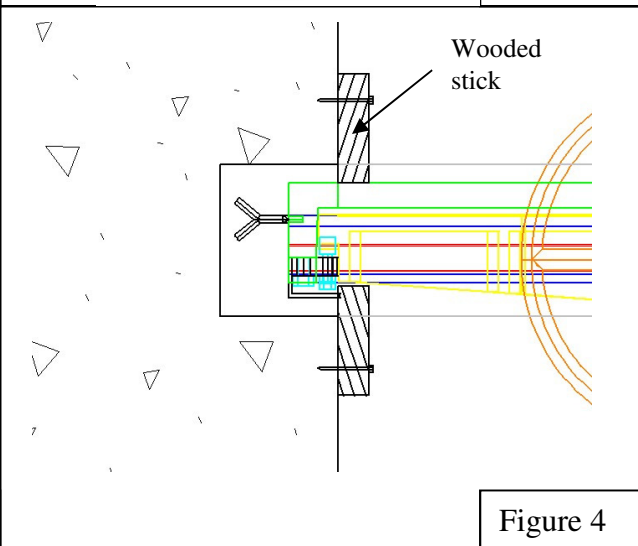
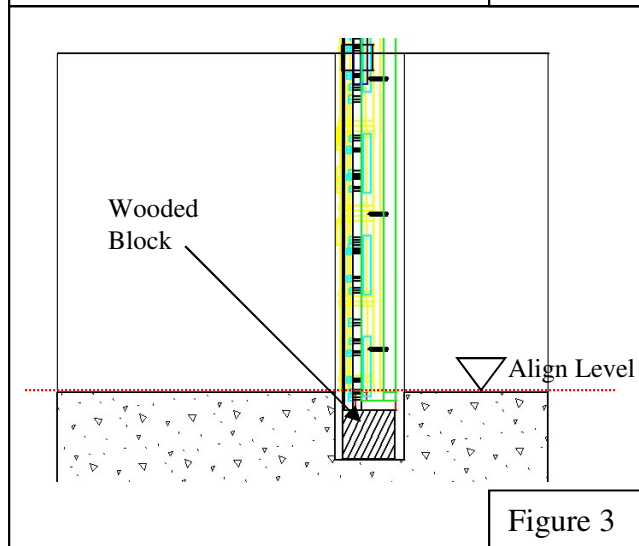
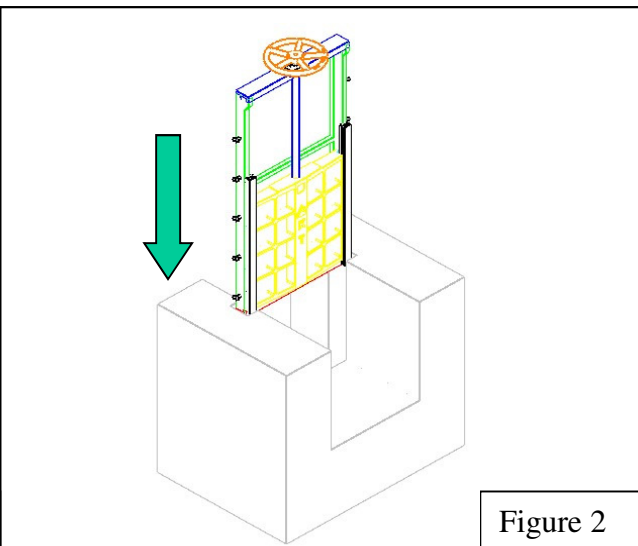
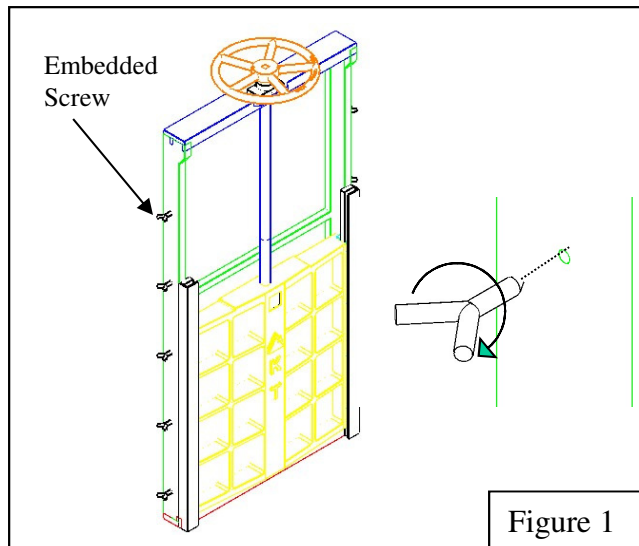


# Channel Penstock Installation Method

## Channel Penstock Installation Method

- First of all, before install, make sure the penstock are clean. Assure no concrete, grout or sealant to get into the guide or seating areas.
- Before, install, the channel penstock groove shall be prepared as the standard request. Make sure the channel groove are straight for easy installation.
- Screw on the embedded holding screw to the 2 side if channel penstock frame with the screw thread provided as Figure 1. Make sure the sufficient number of embedded screw been used for the channel penstock installation.
- Put on the channel penstock to the civil groove as figure 2. Be careful!! The penstock MUST slot into the groove vertically with care to prevent damaging cause by knocking to the concrete wall. Do not force the gate or frame into stress or warpage condition.
- Adjust the level/ high of the penstock where the flush bottom seal shall flush to the lower aperture floor. Please make sure the penstock always in straight and align with the aperture (Figure 3).
- After level the penstock, align the penstock side frame with timber stick at two side(Figure 4) to keep the penstock perfectly straight in any direction before pouring the grouting.
- During pour the grouting, make sure the flush bottom seal and gate are fully covered. Pure the grouting to the frame(left, right and bottom) to secure the gate position. Make sure no any concrete or grouting is slip to the gate or any seating area (figure 5).
- Wait for the grouting fully dry before operating the gate. Please refer to the grouting specification for the grouting curing time.
- During start operate the gate, clean the seating surface of the gate to make sure it is clean. This is IMPORTANT to make sure the gate seal is no damage.
- After clean the seating surface, the penstock us ready to operate.

# Channel Penstock Installation Method



# Penstock Accessories Installation Methods

## Procedure for Installation On Wall Thimble or Pipe Flange

- Place the thimble correctly in position. Plumb is used to align the top/bottom center line. Mark the center line and install the thimble either flush or slightly projecting from the wall
- Thimble need support to prevent warpage during concrete pouring. Do not mount penstock when thimble are not cast with concrete.
- All tap hole must be plug by mild steel before pouring concrete.
- Double check on the vertical and perpendicular alignment of thimble before casting concrete.
- Gate frame need to clean before installing. For better sealing, a thin coat of mastic or rubber compound is apply on the front face of the thimble.
- After all the procedurals complete, mount the penstock to the thimble. Tighten the nuts on the stud or screw uniformly until metal to metal contact is made.

## Procedure for Installation Stems and Stem Guide

- After the installation of penstock is complete, install the stem to the penstock and thread the stem into thrust nut in the nut pocket on cover until flush with bottom of nut.
- Tighten the set screws to lock the stem for the rising stem.
- Mount the stem guides from bottom up as stem is install. In this moment, do not tighten stem guide assembly bolts.
- Tighten the stem guide bracket to the wall with the spacing provide.
- Install the stem couplings as required, tighten all the set screws of the stem couplings.
- Make sure not to bend or damage the stem and threads during installation.

## Procedure for Installation Headstock & Mounting Bracket:

- Headstock bracket mount by the anchor bolts to the wall. Check the top surface and make sure is align perpendicularly with the stem is pass through the center of the stem slot.
- After the headstock bracket is install completely, put on the headstock on top of the bracket and adjust and position the headstock properly by connect straightly to the stem with muff coupling.
- Tighten or lock the muff coupler to the stem and headstock shaft and then secure the headstock to the headstock bracket by tighten mounting bolts.
- After install the headstock, apply the tension to the stem by lifting the penstock. Align the stem guides and tighten the stem guide assembly bolts.





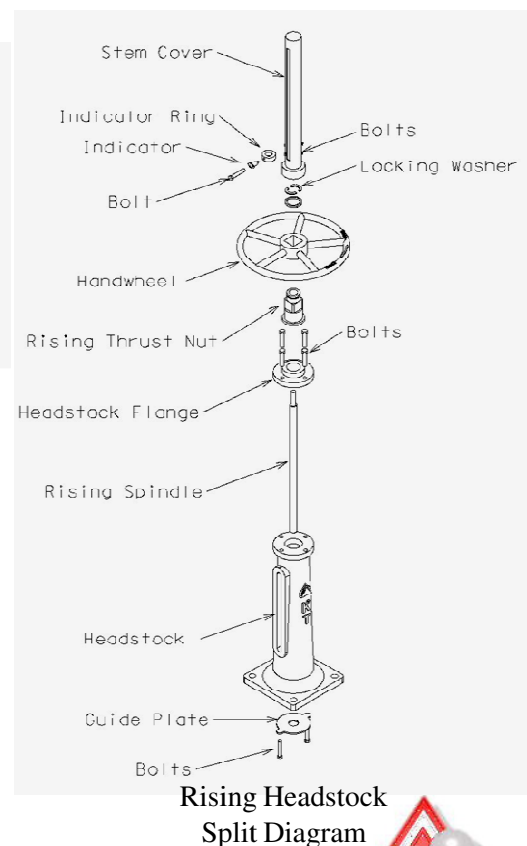
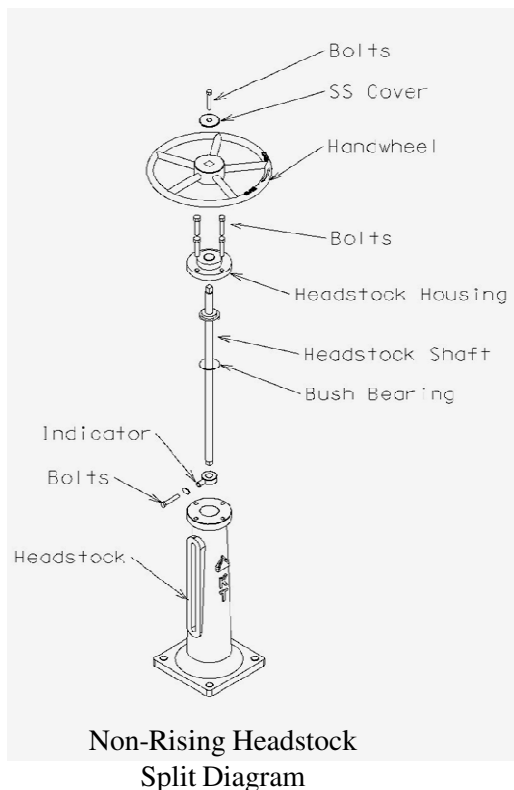
# Penstock Accessories Installation Methods

## Setting Position Indicators (Non-Rising)

- When installing the manual headstock, make sure the penstock is in FULLY CLOSE position.
- Set the headstock indicator to FULLY CLOSE position by turning the handwheel.
- Position the headstock to the bracket or slab and align properly to the stem.
- Connect the stem with the headstock shaft by the muff coupling and tighten the the muff coupling.
- Secure the headstock to the wall bracket or slab by tighten the 4 nos. mounting bolts.

## Setting Position Indicators (Rising)

- When installing the manual headstock, make sure the penstock is in FULLY CLOSE position.
- Position the headstock to the bracket or slab and align properly to the stem.
- Connect the stem with the headstock shaft by the muff coupling and tighten the the muff coupling.
- Secure the headstock to the wall bracket or slab by tighten the 4 nos. mounting bolts.
- To install the indicator, first of all, secure the rising thrust nut with nut lock and handwheel.
- Put on the 2 pieces of locking plate into the slot on top of the thrust nut and put on the indicator ring onto the headstock shaft
- Put on the stem cover and tighten it with locking plate by 4 nos. of screws.
- After secure the stem cover, adjust the indicator ring to the FULLY CLOSE position and screw on the indicator pointer onto the ring by the screw.

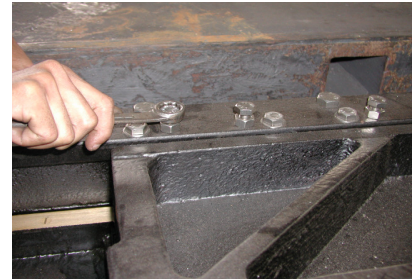


# WEDGE ADJUSTMENT

All wedges are correctly adjust in factory. Due to the miss-handling or misalignment during installation, re-setting of the wedges is always required after installation.

## Side wedges adjustment

1. Loosen adjusting screw locking nut and then loosen the adjusting screw as well. As photo SW1.
2. Loosen wedge locking nut as photo SW2.
3. Close the gate so that the seat surface at gate is align to the seat surface to the frame.
4. Tighten both adjusting screws until proper seat is attained.
5. Tighten wedge locking nuts.
6. Tighten adjusting screws lock nuts.
7. Check the movement of the gate, is too tight gate position, the wedges request readjust wedges again.



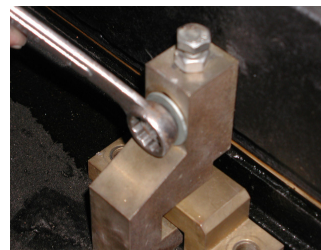
SW1: Adjusting Screw



SW2: Wedge locking screw

## Top/BOTTOM wedges adjustment

1. Loosen wedge locking screw nut slightly as photo TW1 & BW1.
2. Loosen adjusting screw lock nut wedge locking nut and tighten the adjusting screw until proper seating is attained. as photo TW2 & BW2.
3. Tighten wedge locking nuts.
4. Tighten adjusting screws lock nuts.
5. After the wedges has adjusted, check the wedge surface one by one with 0.1mm feeler gauge.
6. Check the seating surface with 0.1mm feeler gauge as well to make sure the gauge can't insert to the seating surface (FG1).
7. If the feeler gauge can insert at the seating surface, readjust the wedges is require.
8. Make sure the penstock can only start the operation when it pass all the feeler gauge checking.



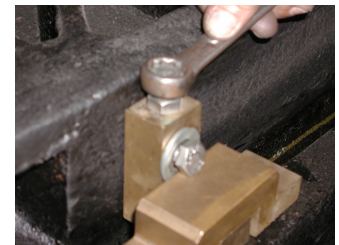
TW1: Wedge locking screw



TW2: Adjusting screw



BW1: Wedge locking screw



BW2: Adjusting screw



FG1: Feeler Gauge Checking