

# INSTALLATION, OPERATION AND MAINTENANCE MANUAL

## RB MODEL WEIR GATE



INDEX

	<u>Page</u>
0. Introduction .....	2
1. Handling and storage.....	2
2. Equipment main components .....	3
3. Installation .....	4
3.1. Installation: Concrete wall mounted.....	4
3.2. Installation: Stem extension, stem guides and floor stand (when applicable).....	6
4. Operation.....	8
5. Maintenance.....	9
5.1. Cleaning and lubrication.....	9
5.2. Vertical and bottom seals replacement .....	10
6. Trouble shooting.....	12
7. Environmental considerations.....	12

**0. INTRODUCTION**

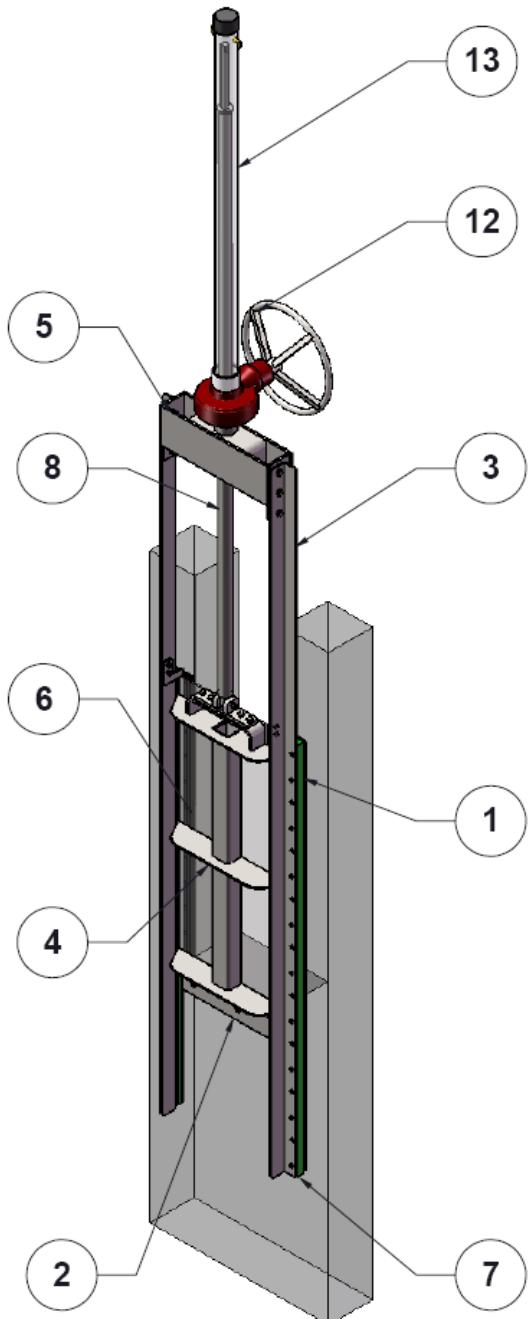
- This manual describes the recommended procedures for installation, operation, maintenance and safety precautions for ORBINOX RB model weir gates
- Please read thoroughly all the instructions in the manual prior to installation and contact an ORBINOX representative in case of any questions
- The manual makes reference to the "General Arrangement Drawing" (GAD). The GAD is the drawing that is sent to and approved by the customer prior to the production of the weir gate
- **ORBINOX assumes no responsibility or liability if the slide gate is not installed, operated and maintained in strict accordance to the procedures described in this manual**

**1. HANDLING AND STORAGE**

Standard safety procedures should be followed to prevent personal injury or equipment damage. Additionally, the following instructions shall be followed during handling and storage to prevent any damage of the product:

- Stems have precision surfaces and should never be used as a mean to lift the slide gate
- Equipment shall be stored in a dry, clean and even area on a raised even wood surface to prevent distortion of the frame
- Do not stack slide gates
- Stems and extensions that are shipped separately shall be supported over their entire length to prevent any bending or distortion while in storage

## 2. EQUIPMENT MAIN COMPONENTS



ITEM	DESCRIPTION
1	FRAME
2	FRAME INVERT
3	FRAME GUIDE
4	SLIDE
5	YOKE
6	EPDM SEAL
7	(U)HMWPE GUIDE
8	THREADED STEM
12	BEVEL GEAR HANDWHEEL ACTUATOR (OTHER ACTUATORS AVAILABLE)
13	STEM PROTECTOR

### 3. INSTALLATION

This section describes the different installation methods

In order to avoid personal injury or damage to property when handling and installing the valve, it is important to observe the following warnings:

- Qualified and trained personnel must carry out the handling and maintenance of the valve
- Use suitable Individual Protection Equipment (IPE) (gloves, safety footwear...)

#### 3.1. Installation: concrete wall mounted

##### ► Required Materials:

- ORBINOX RB Weir Gates are installed by means of Anchor Bolts. Depending on the size and working conditions they shall be either of the mechanical or chemical type. In order to get the expected performance of the anchor bolts, the minimum concrete strength shall be 25 MPa (3,625 PSI)
- In order to avoid leakage between the concrete wall and the frame, construction sealant shall be used. (Sikabond/Sikaflex 11FC Sealant or equivalent, 200ml per meter of opening perimeter). As an alternative, self-adhesive commercial sponge EPDM strips, approximately 20mm/0,80" wide by 10mm/0,40" thick, can be used and glued to the slide gate around the hole
- For detailed information about the type, size and quantity of the required anchor bolts, or any other specific installation notes or materials, please refer to the notes on the „General Arrangement Drawing“

##### ► Installation procedure:

###### Step 1: Concrete wall surface inspection

- The concrete construction shall be flat, level and plumb, and shall be in accordance to DIN 18202 or ACI 117-06 standards. If necessary, use non-shrink grout in order to meet the specified standard
- Concrete wall surface shall be dry (so the construction sealant sets effectively). If it is necessary, the wall can be dried with the help of a blowtorch or a hot air fan

###### Step 2: Pre-installation of the weir gate

- Position the weir gate against the wall and line up with the channel
- Drill and install an anchor bolt on each side of the gate (see Figure 2). After installing the first anchor bolt, and prior to drilling the hole of the other side, make sure the frame is perfectly leveled

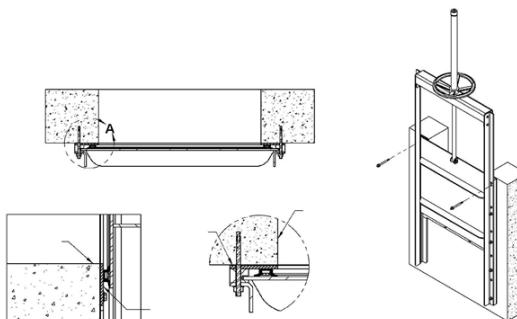


Figure 1

### Step 3: Construction sealant application

- In order to avoid leakage between the frame and the wall, construction sealant shall be applied on the frame:
  - Remove the weir gate from the wall (first remove the nuts of the anchor bolts).
  - Apply construction sealant all around the perimeter of the frame. Sikabond/Sikaflex 11FC (200 ml/m) or equivalent construction sealant shall be used. Be sure not to get sealant on the gate's seals, guides, and/or stem, as this may cause leakage or damage.

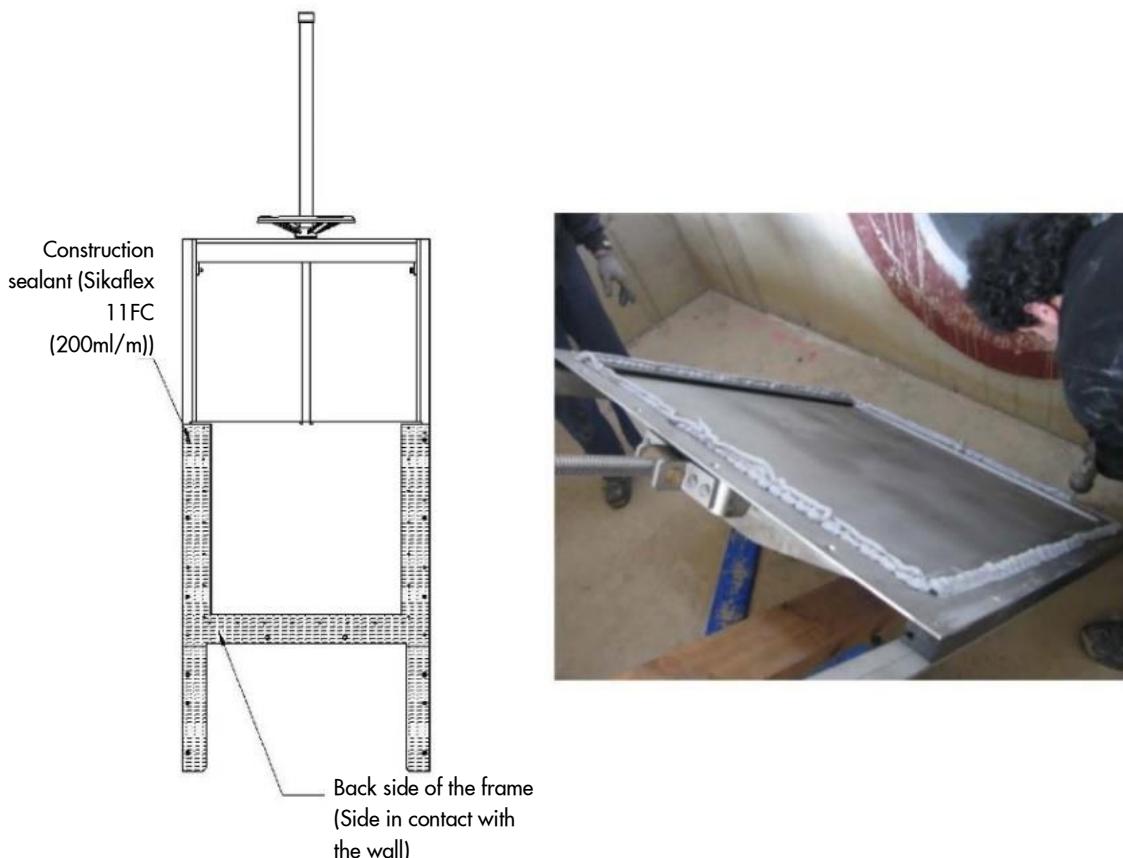


Figure 2

### Step 4: Final installation

- Place back the gate on the wall at the previously installed anchors
- Drill and install the rest of the anchor bolts

**CAUTION!**: If the weir gate is not completely in contact with the wall, do not over-tighten the anchor bolts. Over tightening may bend or distort the frame. If the wall flatness and levelness is according to the specified standards, the construction sealant will fill in the remaining void

- Apply construction sealant around the frame in order to fill in any existing gap between the wall and the frame (this step is only for esthetics). Wipe away the excess sealant to leave a smooth finish.

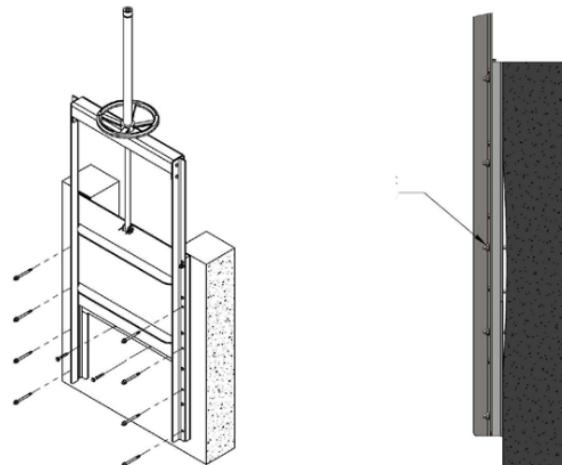


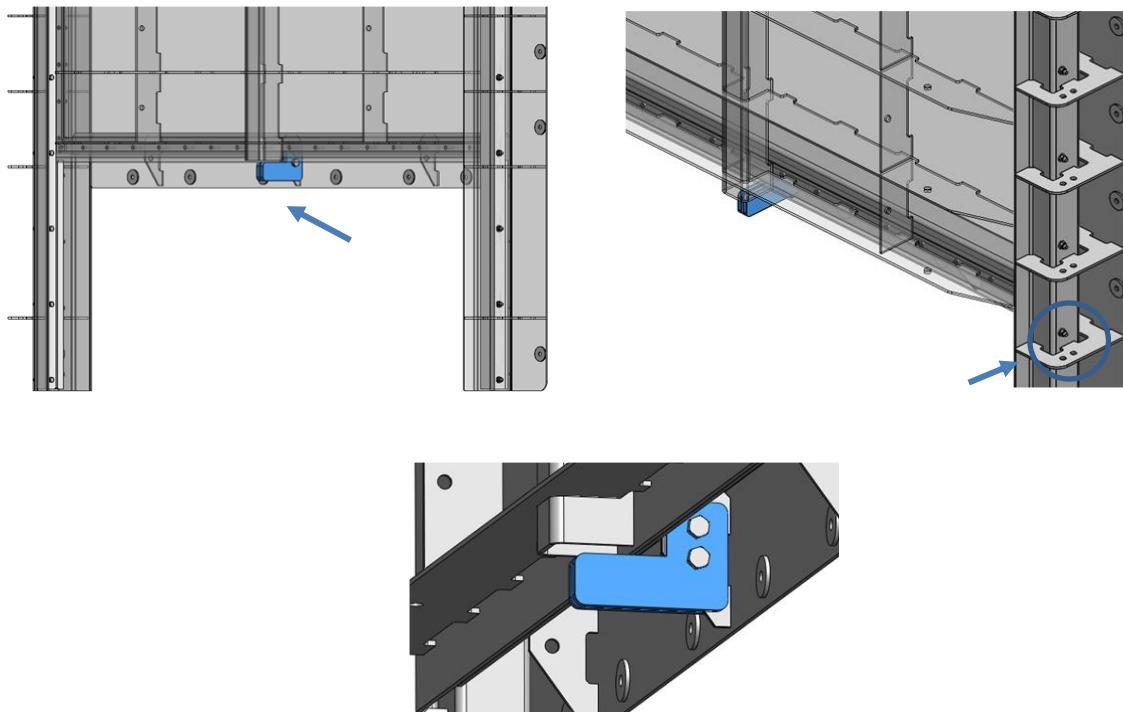
Figure 3

**CAUTION!**

The slide is shipped locked by a "L" part similar to the one shown in the picture. The purpose of this piece is to prevent the slide from falling freely downwards if the actuation system is disassembled after the penstock has been installed against the wall. This can happen at the Slide-Stem connection or at the Stem-Actuator connection.

For this reason, it is mandatory to lock the slide during initial assembly and during any maintenance that involves disassembly of the actuation system.

Finally, to prevent damage to the penstock, the piece must be disassembled before operating the penstock. For storage purposes, the frame ribs shall be used.



### 3.2. Installation: stem extension, stem guides and floor stand (when applicable)

- Some RB weir gates include stem extensions, extension guides and floor stand (depending on the configuration of the civil works)
- Once the gate is installed, the rest of the elements must be installed:
  - Connect the stem extension (item 3) to the shaft (item 1) on top of the yoke
  - Insert all stem guides from the top of the stem extension (when applicable). Align stem extension, and especially make sure that it is aligned with the vertical axis of the opening
  - Next, install all stem guides (drill and tighten anchor bolts). Refer to General Arrangement Drawing for dimensions
  - Position the floor stand and the operator. Engage the shaft of the stem extension with the operator. Make sure that the stem extension is perfectly aligned and parallel to the wall surface, adjusting the offset if necessary, of the Stem-Guides™ (U)HMWPE inserts. Once, the stem extension is perfectly aligned, install the floor stand (drill and tighten anchor bolts)

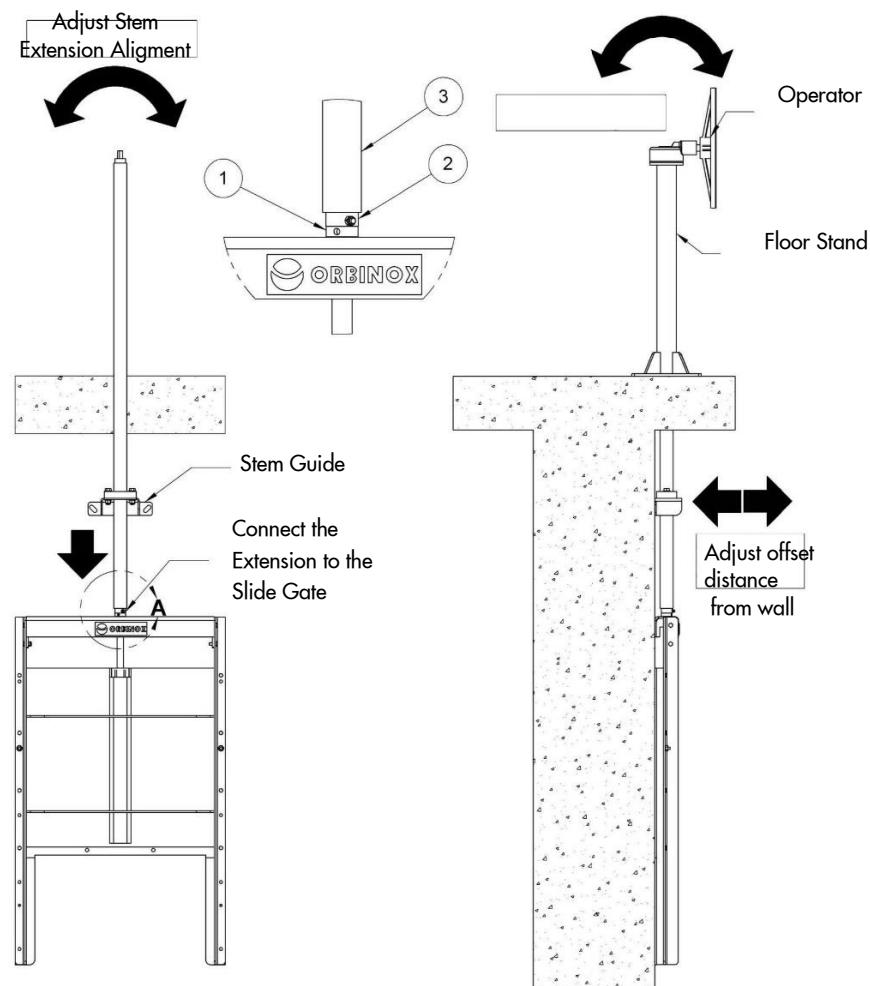


Figure 4

## 4. OPERATION

### Initial Operation:

Before cycling the weir gate, make sure there are no foreign deposits or materials on the seals, guides or sealing area. Gate seals could be damaged if the area is not cleaned and coated with a light grease. Please refer to section *"Materials needed for maintenance and seal replacement"* for detailed information about the grease type.

#### • Manual

Apply a light grease on the stem before initial operation after the installation. If the operation is difficult due to high torque, stop operation of the gate and check stem alignment.

#### • Electric actuator

- Refer to the electric actuator manufacturer instruction manual before commissioning the weir gate
- Electric actuators must be limited with limit and torque switches. Electric actuators without these limiters shall not be used with ORBINOX weir gate. Electric actuators must be adjusted at the time of installation on site (except in the case of a self-contained frame and yoke-mounted actuators; in this case the motor is factory-set). To adjust the limit switches, follow the next instructions using values of the GAD:
  - Position the slide in the nearly closed position (leave 10mm /0,40" open). From this position, manually (using the handwheel) operate the slide until it is completely closed (check tightness with a 0,05mm/0,002" gauge). In this position, set the limit switch for the CLOSED position
  - Position the slide in the nearly open position (leave 10mm /0,40" closed). From this position, manually (using the handwheel) operate the slide until it is completely open. In this position, set the limit switch for the OPEN position
- Be aware when the gate is almost fully OPEN or CLOSED. If the gate does not stop once the fully open or fully closed position is reached, stop immediately and correct adjusting again the limit and torque switches

### Operation:

- **CAUTION!** Do not force the operator to close the gate, as it may cause damage to the stem and it does not improve the sealing system. **The maximum applicable force on the handwheel is 25 kg /55 lbs**
- The RB weir gate is closed by a clockwise rotation, and opened (downwards) by a counter-clockwise rotation of the operator
- The RB weir gate is designed to be self-locking, so that the slide maintains its position in open, close or intermediate positions

## 5. MAINTENANCE

### 5.1. Cleaning and lubrication

ORBINOX model RB weir gates need practically no maintenance. In order to assure maximum performance of the weir gate, the following maintenance inspections shall be carried out periodically (every 6 months):

- Stem and stem nut shall be cleaned and greased. In some configurations, the stem may be in contact with water and dirt. Under these conditions, the threads of the stem and/or stem nut may wear, and they shall be checked every 3 months.
- Clean the gate with clear water and remove any deposits, especially on the seals and in the guides.

 **Weir gates installed in ATEX atmospheres: Dust deposits above 5mm are specifically not acceptable. Increase cleaning periodicity**

- Check the seals and make sure they are not damaged. Seals shall be replaced if damaged. See section „Maintenance: Seal Replacement“ for detailed procedures about seal replacement
- Seals shall be wet while operating. If the weir gate has not been used for a long period of time under dry conditions, the seals shall be wetted with clear water before operating the weir gate. Operating the gate with dry seals may damage the seals. Additionally, more torque may be required to operate the weir gate

#### Spare parts:

ORBINOX does not recommend stocking any spare parts by the owner of the equipment as the weir gates are designed for a very long life cycle. If a repair part is required, please contact an ORBINOX representative and provide the following information:

- ORBINOX S/O number
- “ORBINOX General Arrangement Drawing” number
- Project name (if applicable)
- Vendor’s company name

#### Materials needed for maintenance and seal replacement:

Material	Type	Recommended or equivalent
Grease	Silica-Gel Silicone Grease	Verkosil G-2 (no toxic)
Glue	Instant adhesive	Loctite 495

## 5.2. Vertical and bottom seals replacement

The procedure for replacing the seal is described below. Please note that in any case, the slide must be first removed from the frame. It is not necessary to remove the frame from the wall

### Weir gates (200 x 200mm/8" x 8" to 1200 x 1200mm/48" x 48")

- From the closed position unscrew the nuts and remove the washers of the lateral anchor bolts
- Unscrew bolts (item 3). CAUTION! the slide is no longer secured
- Remove frame guides (item 4), (U)HMWPE guides (item 5) and slide (item 7)
- Unscrew bolts and remove retainers (items 10 and 11)
- Remove seal (item 12) and replace it by the new seal. After installing the new seal, apply grease on it to ease operation

NOTE: the shaft must be completely empty to carry out this maintenance operation as the seals are bolted to the frame

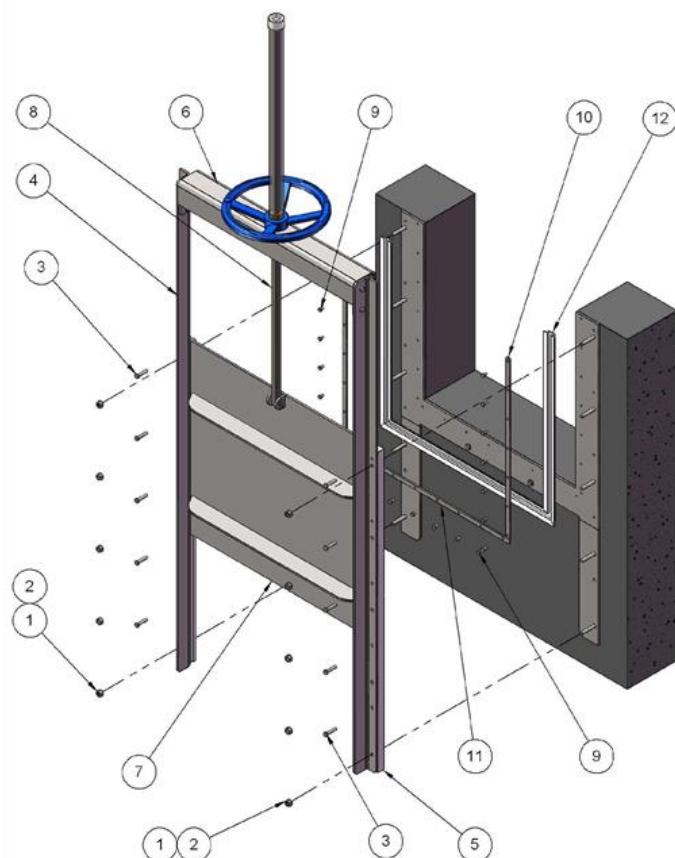


Figure 5

**Weir gates (1250x1250mm/49" x49" to 2000 x 2000mm /80" x80")**

- Start from the open position
- Remove the yoke (upper part of frame, item 2), the stem (item 3) and the slide (item 5) as a single assembly. To do this, first loosen the bolts and nuts on the yoke
- Remove the seal retainer (items 7 and 8)
- Remove seal (item 9) and replace it by the new seal. After installing the new seal, apply grease on it to ease operation.

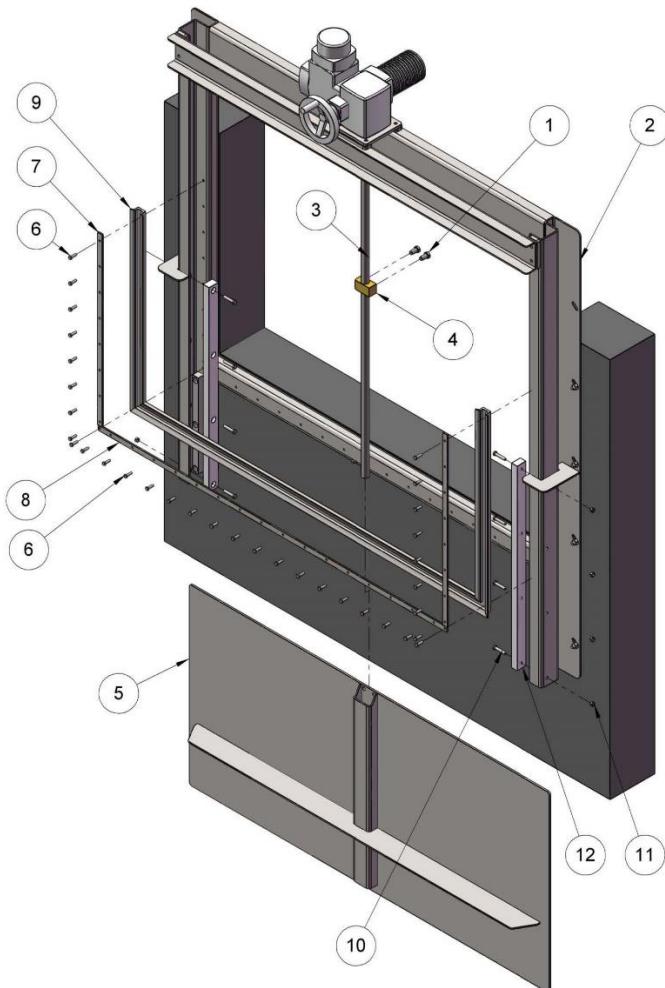


Figure 6

## 6. TROUBLE SHOOTING

SYMPTOM	CAUSE	SOLUTION
Leakage between weir gate and concrete wall	Concrete wall does not meet the required std.	Un-install the weir gate and fix the wall
	Not enough construction sealant.	Un-install the weir gate, clean the wall and apply a new layer of construction sealant
	Loose anchor bolts	Tighten anchor bolts
	Incorrect anchor bolts	Check the „General Arrangement Drawing“ and make sure the right anchor bolts have been installed
Leakage through the lateral /vertical seal	Damaged seal	Replace seal
Leakage through the bottom seal	Foreign material trapped between frame and seal	Remove the foreign material. Check if there is any damage to the seal
	Damaged seal	Replace seal
Excessive force required to operate the slide gate	Misaligned stem extension, stem guide, or floor stand	Check and adjust alignment of stem extension, stem guide or floor stand
	Dirty stem and/or stem nut	Clean and lubricate stem and/or stem nut

## 7. ENVIRONMENTAL CONSIDERATIONS

- The packaging is made from environmentally friendly materials. Dispose of the packaging through the available recycling channels
- The valve is designed and manufactured with materials that can be recycled by specialised recycling firms. Once the life of the product is expired, you have to consider a proper disposal of the product in order to prevent any negative impact on the environment and allows for the recycling of valuable commodities
- Please follow the local environmental rules in your country for proper disposal