



Installation, Operation and Maintenance Manual

MU Slide Gate

INSTALLATION, OPERATION AND MAINTENANCE MANUAL		02-2010 Edition Revision- A
MODEL	MU SLIDE GATES	 ORBINOX <small>VALVE SOLUTIONS IN MORE THAN 70 COUNTRIES</small>

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INTRODUCTION

This manual describes the recommended procedures for installation, operation, maintenance and safety precautions for Orbinox MU model slide 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 slide 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.**

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.
- Special care shall be taken on any machined surface when lifting the 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.

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INSTALLATION: CONCRETE WALL MOUNTED

Required Materials:

Orbinox MU Slide 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. Note that as standard, anchor bolts and construction sealant are not supplied with the slide gate.

Note: for gates larger than 80"x80" and un-seating water head conditions, anchor bolts are not sufficient to hold the gate in place. A second phase of concrete will be required around the gate frame, and will be indicated on the GAD.

In order to get the expected performance of the anchor bolts, the minimum concrete strength shall be 3,000 PSI (20.7 MPa).

In order to avoid leakage between the concrete wall and the frame construction sealant shall be used. (Sikabond Construction Sealant or equivalent, 200ml per meter of opening perimeter).

The following table gives a general description of the required anchor bolt types for the different gate sizes and pressure conditions. 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'.

MU Size	Water Pressure	Anchor Bolt Type	Recommended (Hilti or equivalent)
MU BI-DIRECTIONAL 6" x 6" - 48" x 48" (150mm x 150mm - 1000mm x 1000mm)	Seating and Un-Seating (Bi-Directional)	Stud Type Mechanical Anchor Bolts and Bolt Type Mechanical Anchor Bolts	Hilti 'Kwik 3' and Hilti 'HSL'
MU BI-DIRECTIONAL 52" x 52" - 80" x 80" (1100mm x 1100mm - 2000mm x 2000mm)	Seating and Un-Seating (Bi-Directional)	Chemical Anchor Bolts	Hilti 'HVU'
MU UNI-DIRECTIONAL 52" x 52" - 80" x 80" (1300mm x 1300mm - 2000mm x 2000mm)	Seating (Uni-Directional)	Stud Type Mechanical Anchor Bolts	Hilti 'Kwik 3'

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INSTALLATION: CONCRETE WALL MOUNTED

continued

Step 1: Concrete wall surface check:

Concrete wall surface shall be inspected before starting the installation of the slide gate:

- The concrete construction shall be flat, level and plumb, and shall be in accordance to ACI 117-06 standard. 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: Reference lines:

Reference lines shall be marked on the wall in order to assure a proper alignment between the slide gate and the opening during the installation:

- Measure the top width of the frame ("d") and mark a horizontal line on the wall (RL-1), parallel to the opening and to the measured distance.
- Mark a vertical line on the vertical symmetry axis of the opening (RL-2).

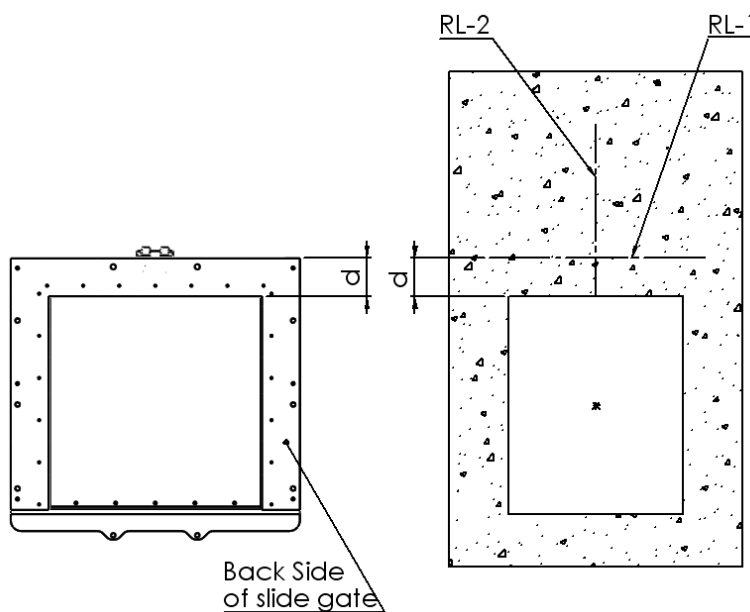


Figure 1

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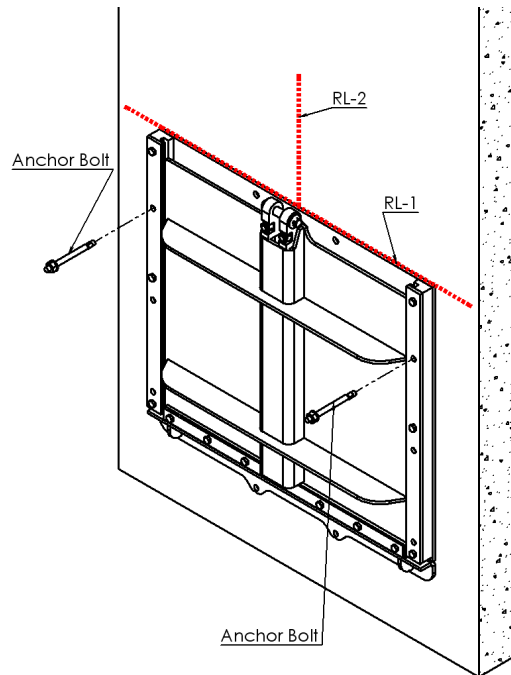
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INSTALLATION: CONCRETE WALL MOUNTED

continued

Step 3: Pre-installation of the slide gate

- Place the slide gate against the wall and line up with the opening. Use previously marked reference lines for proper alignment. The gate shall be in the closed position.
- Drill and install an anchor bolt on each side of the gate. After installing the first anchor bolt, and prior to drilling the hole on the other side, make sure the frame is perfectly leveled.

**Figure 2****Step 4: Construction sealant application (Sikabond or equivalent)**

In order to avoid leakage between the frame and the wall, construction sealant shall be applied on the frame:

- Remove the slide gate from the wall (first remove the nuts of the anchor bolts).
- Apply construction sealant all around the perimeter of the frame. Sikabond (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.
- Re-install the slide gate on the wall and tighten both anchor bolts.

**Figure 3**

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INSTALLATION: CONCRETE WALL MOUNTED

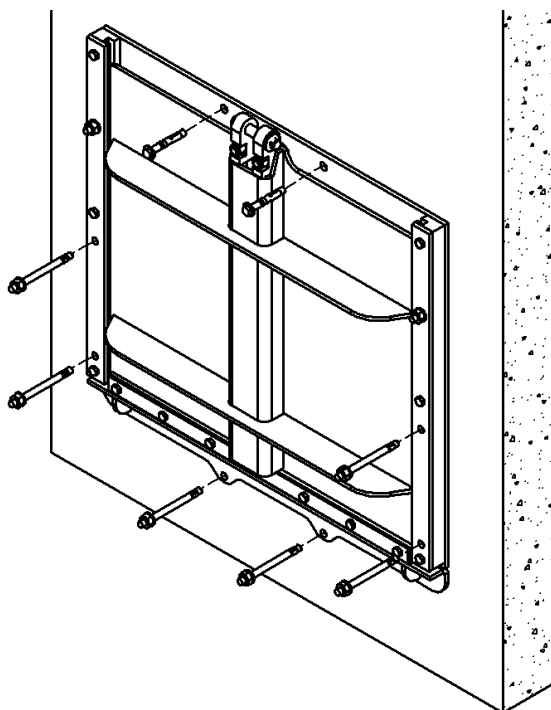
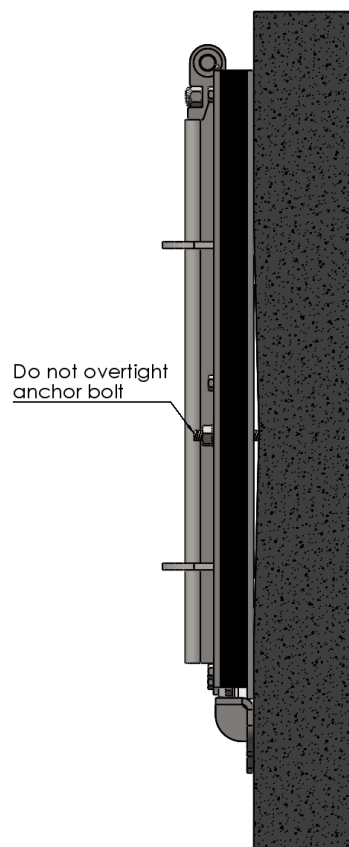
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Step 5: Final installation of the slide gate

- Drill and install the rest of the anchor bolts (see Figure 4).

CAUTION! If the slide 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 (see Figure 5).

- 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 4****Figure 5**

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INSTALLATION: ROUND MANHOLE MOUNTED

Follow the instructions of “Concrete Wall Mounted” installation. Anchor bolts shall be installed perpendicular to the surface.

INSTALLATION: WALL THIMBLE MOUNTED

Required Materials:

Orbinox Wall Thimble Mounted MU Slide Gates are installed by means of Hex Bolts. In order to avoid leakage between the wall thimble and the frame, construction sealant shall be used. (Sikabond Construction Sealant or equivalent, 200ml per meter of opening perimeter). For detailed information about the size and quantity of the required bolts, or any other specific installation notes or materials, please refer to the notes on the ‘General Arrangement Drawing’. Note that as standard, bolts and construction sealant are not supplied with the slide gate.

Installation:

- The concrete construction shall be flat, level and plumb, and shall be in accordance to ACI 117-06 standard. If necessary, use non-shrink grout in order to meet the specified standard.
- Apply construction sealant all around the perimeter of the frame. Sikabond (200 ml/m) or equivalent construction sealant shall be used.
- Partially tighten the four corner bolts, and check that the slide gate is perfectly lined up with the wall thimble opening.
- Install the rest of the bolts, and evenly tighten all of them.

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INSTALLATION: STEM EXTENSION, STEM GUIDES AND FLOOR STAND

Procedure for open-frame and rising-stem configurations:

Once the slide gate has been installed, the stem extension, stem guide(s) and the floor stand shall be installed (when applicable). The following procedure shall be followed:

1. Connect the stem extension to the slide gate (Figure 6 and Detail A). Connect the stem extension (item 1) using the pin (item 4). In order to be able to do so, the washer (item 2) and the cotter-pin (item 3) shall be removed and re-installed.
2. Insert all stem guides from the top of the stem extension. Align stem extension, and especially make sure it is aligned with the vertical axis of the opening (see Figure 7). The maximum misalignment shall be 1/8" (3mm).
3. Next, install (drill and tighten anchor bolts) all stem guides except the first one (See Figure 7 and 8, "Stem Guide-1") . Refer to General Arrangement Drawing for dimensions ("Dist 1", "Dist 2", in Figure 7).
4. Thoroughly clean and grease the threaded part of the stem and the nut in the operator.
5. Position the floor stand and the operator. Engage the stem in the stem nut and turn the pedestal and the operator to bring it to the operating floor level. Make sure that the stem extension is perfectly aligned and parallel to the wall surface, adjusting the offset if necessary of the Stem-Guides' UHMWPE inserts (see Figure 8). Once the stem extension is perfectly aligned, install the floor stand (drill and tighten anchor bolts) .
6. Operate the slide gate and bring it to the open position. Install "Stem Guide-1", so the top of the slide hits on the stem guide. Note that "Stem Guide-1" is installed in the orientation shown in Figures 7 and 8 (UHMWPE insert down).
7. Install the stem protector and the position indication label (if applicable).

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INSTALLATION: STEM EXTENSION, STEM GUIDES AND FLOOR STAND

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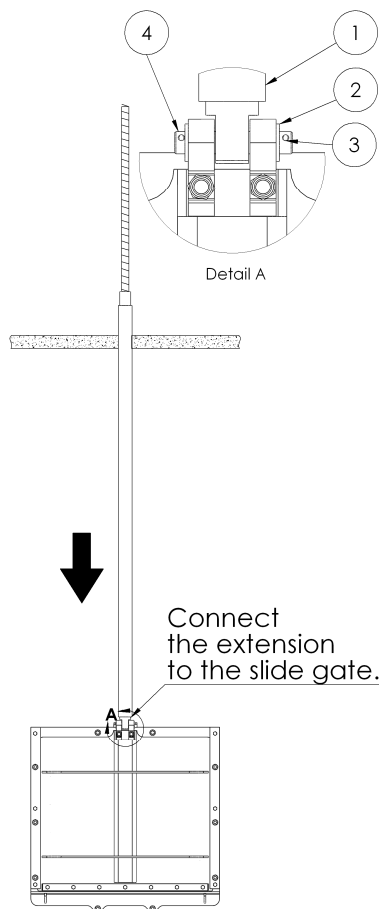


Figure 6

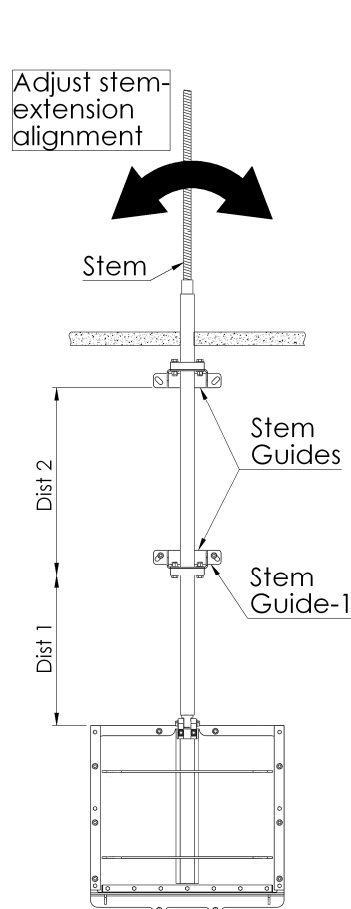


Figure 7

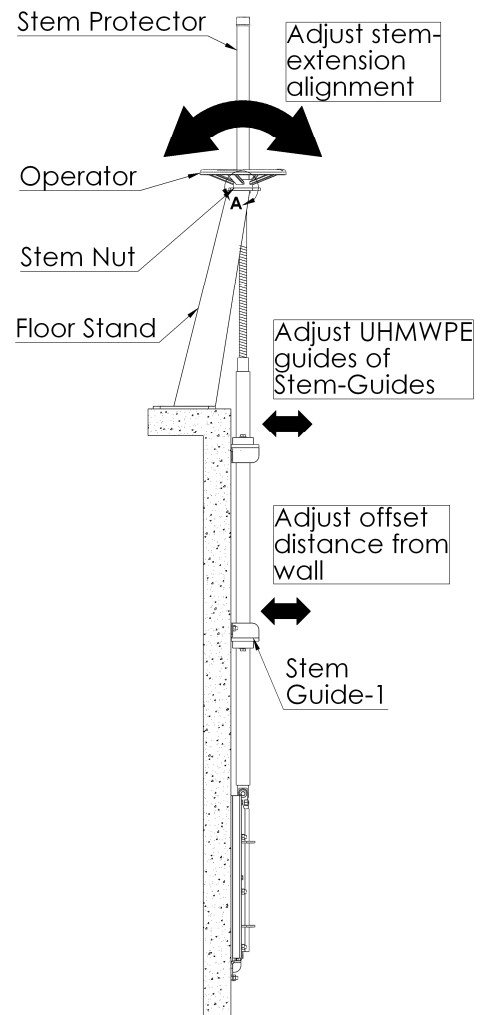


Figure 8

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INSTALLATION: STEM EXTENSION, STEM GUIDES AND FLOOR STAND

Procedure for self-contained-frame and non-rising-stem configurations:

Once the slide gate has been installed, the stem extension, stem guide(s) and the floor stand shall be installed (when applicable). The following procedure shall be followed:

1. Connect the stem extension (item 3) to the shaft (item 1) on top of the yoke (see Figure 9 and Detail B).
2. Insert all stem guides from the top of the stem extension. Align stem extension, and especially make sure that it is aligned with the vertical axis of the opening (see Figure 10). For 2" Sqr. Nut operated gates, the stem guides shall be inserted onto the stem extension from the bottom.
3. Next, install all stem guides (drill and tighten anchor bolts). Refer to General Arrangement Drawing for dimensions ("Dist 1" in Figure 10).
4. 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' UHMWPE inserts (see Figure 11). Once, the stem extension is perfectly aligned, install the floor stand (drill and tighten anchor bolts).

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INSTALLATION: STEM EXTENSION, STEM GUIDES AND FLOOR STAND

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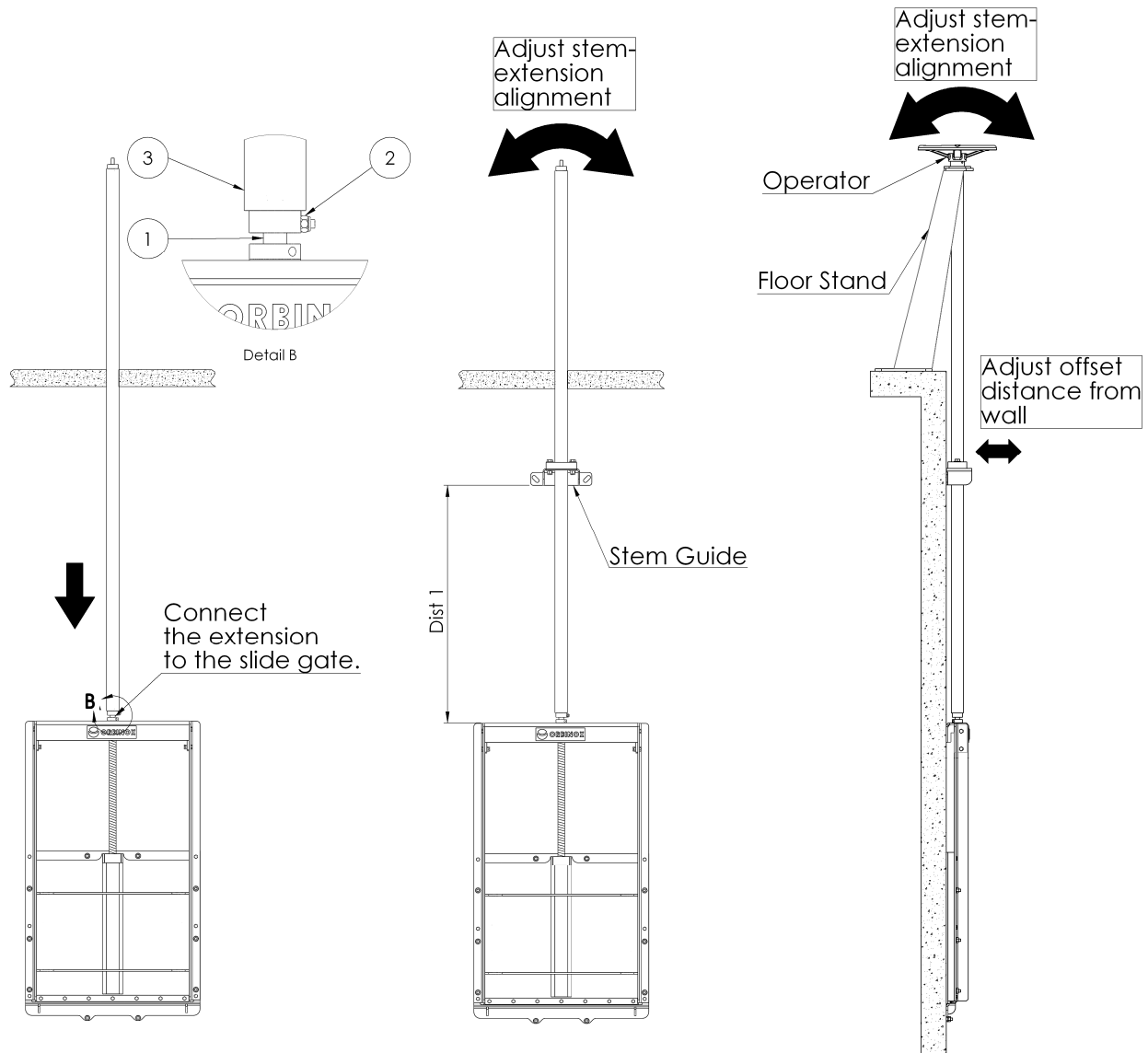


Figure 9

Figure 10

Figure 11

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OPERATION

Initial Operation:

- Before cycling the slide 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" on page 14 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 Motor:**
 - Refer to the Electric Motor Instruction Manual section before cycling the slide gate. Manually open the gate approximately 5" before the initial electric motor operation. Check the motor rotation to assure proper direction of the slide travel according to the motor operation switch (open/close).
 - Special attention should be taken when the gate is almost fully open or fully closed. If the gate does not stop once the fully open or fully closed position is reached, stop immediately and adjust the limit and torque switches (Refer to motor manual).

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 MU Slide Gate is closed by a clockwise rotation, and opened by a counter-clockwise rotation of the operator.
- For self-contained frame configurations, the slide is stopped by the yoke when it is fully opened. For open frame configurations, the stem guide (wall bracket) stops the slide.
- The MU Slide Gate is designed to be self-locking, so that the slide maintains its position in open, close or intermediate positions.

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MAINTENANCE: CLEANING AND LUBRICATION

Orbinox model MU slide gates need practically no maintenance. In order to assure maximum performance of the slide gate, the following maintenance inspections shall be carried out periodically every 6 months:

- Stem and stem nut shall be cleaned and greased. For non-rising stem 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.
- 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 slide 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 slide gate. Operating the gate with dry seals may damage the seals. Additionally, more torque may be required to operate the slide gate.

Spare parts:

Orbinox does not recommend stocking any spare parts by the owner of the equipment as the slide 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
Silicone	Silicone Rubber	Dow Corning RTV 732
Grease	Silica-Gel Silicone Grease	Verkosil G-2
Glue	Instant adhesive	Loctite 495

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MAINTENANCE: SEAL REPLACEMENT (MU 8"X8" TO 48"X48")

Seal replacement procedure for Open-Frame and Rising-Stem configuration slide gates (up to 48"x48").

- **Step 1:** From the closed position, raise the slide around 1/2".
- **Step 2:** Unscrew the nuts of the lateral anchor bolts (item 10).
- **Step 3:** Remove stem extension coupling pin (item 1).

NOTE: the stem extension will not fall down as it is a rising-stem configuration slide gate.

- **Step 4:** Unscrew bolts (item 2) with caution, as major components of the gate are no longer secured.
- **Step 5:** Remove frame guides (item 3), UHMWPE guides (item 4) and slide (item 5).
- **Step 6:** Unscrew bolts (items 6) and remove retainers (items 7 and 8).
- **Step 7:** Remove seal (item 9) and replace it by the new seal.

Note 1: Before installing the new seal, apply silicone on the frame invert, where the seal will be in contact with it (see detail A).

Note 2: After installing the new seal, apply grease on it to ease operation.

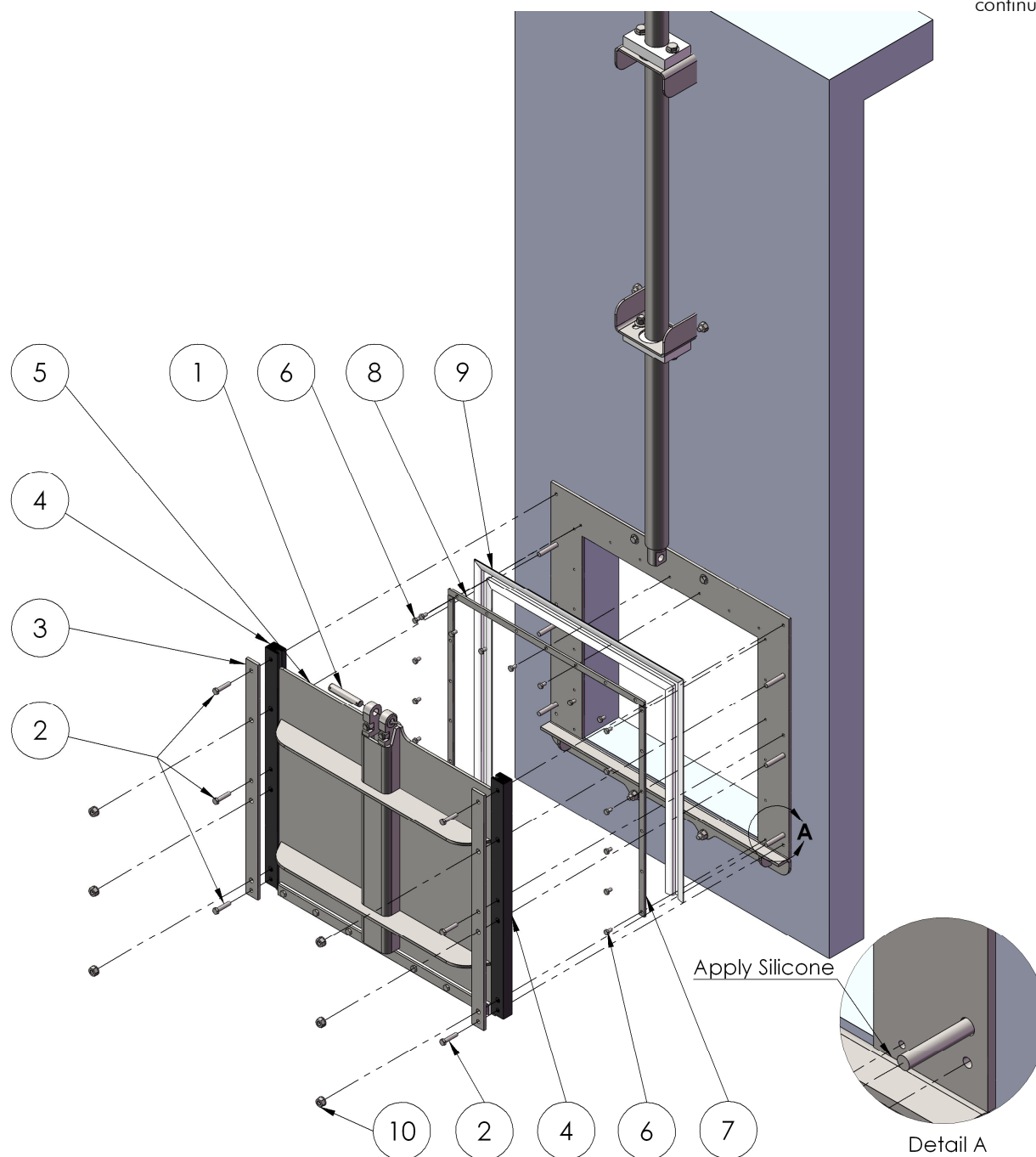
Reassembly:

- **Follow Steps 6 to 1.**

Note: To reassemble in Step 5, first place one of the UHMWPE guides (item 6) on the anchor bolt rods. Next, take the slide (item 5) and attach the other UHMWPE guide onto it. Finally, mate the whole unit to the previously positioned UHMWPE guide.

MAINTENANCE: SEAL REPLACEMENT (MU 8"X8" TO 48"X48")

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MAINTENANCE: SEAL REPLACEMENT (MU 8"X8" TO 48"X48")

Seal replacement procedure for Self-Contained and Non-Rising-Stem configuration slide gates (up to 48"x48").

- **Step 1:** From the closed position, raise the slide around 1/2".
- **Step 2:** Detach the stem extension (if applicable).

NOTE: The stem extension needs to be held in place, otherwise it will fall. Clamp the extension and lean it on the stem guide (if applicable) or on the operating floor.
- **Step 3:** Unscrew nuts and washers of lateral anchor bolts (items 1 and 2).
- **Step 4:** Unscrew bolts (item 3) with caution, as major components of the gate are no longer secured.
- **Step 5:** Remove the 'yoke (item 7), stem (item 9), slide (item 8), and frame guides (item 5) as one unit.
- **Step 6:** Unscrew bolts (item 10) and remove the seal retainer (items 11 and 12).
- **Step 7:** Remove seal (item 13) and replace it by the new seal.

Note 1: Before installing the new seal, apply silicone on the frame invert, where the seal is in contact with it (see detail A).

Note 2: After installing the new seal, apply grease on it to ease operation.

Reassembly:

- **Follow Steps 6 to 1.**

Note: To reassemble Step 5, first place one of the UHWMPE guides (item 6) on the anchor bolt rods. Next, take the yoke, stem, slide, and frame-guides as one unit, and attach the other UHWMPE guide onto it. Finally, mate the whole unit to the previously positioned UHWMPE guide.

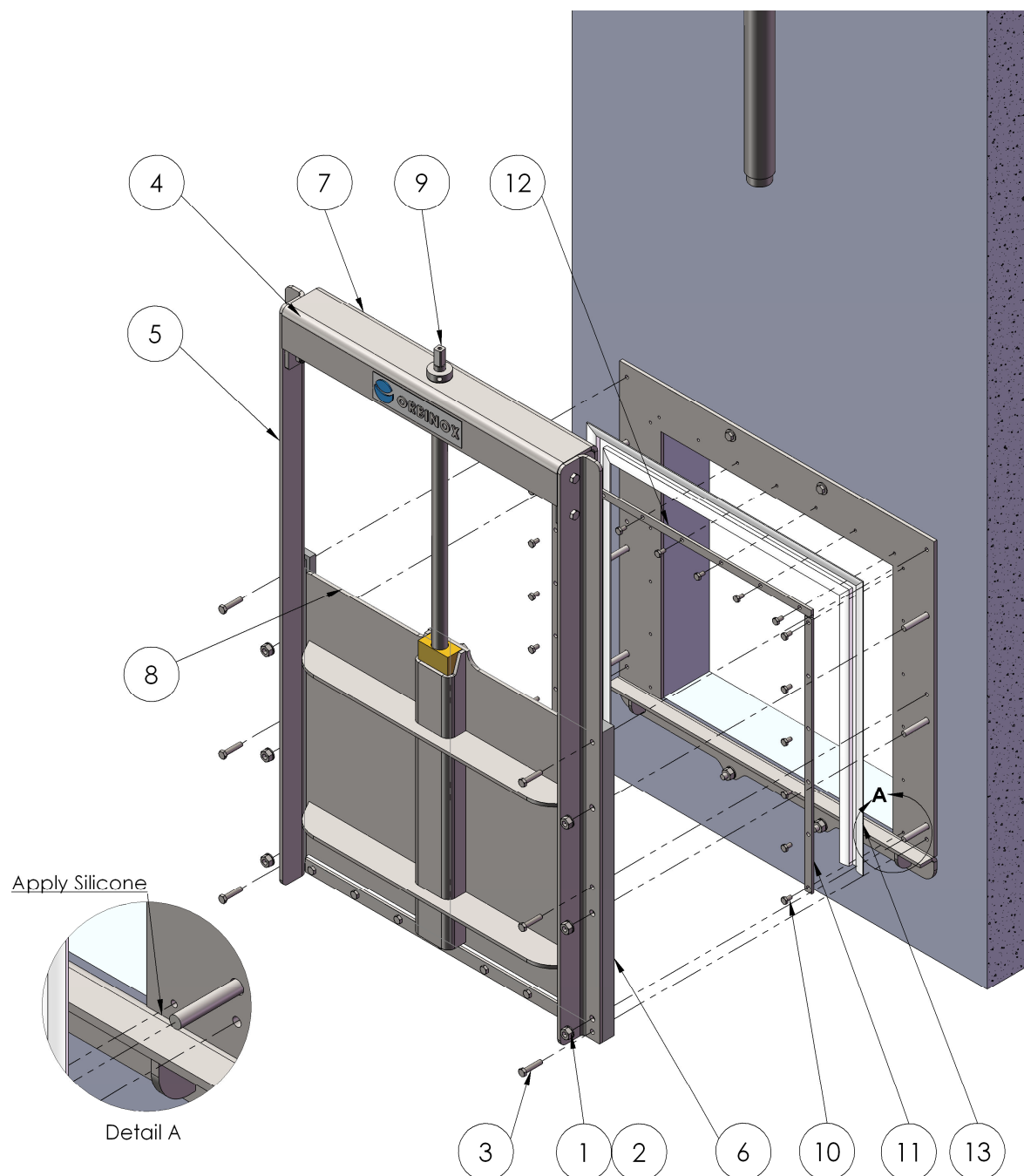
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MAINTENANCE: SEAL REPLACEMENT (MU 8"X8" TO 48"X48")

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MAINTENANCE: SEAL REPLACEMENT (MU 49"X49" TO 80"X80")

Seal replacement procedure for Open-Frame and Rising-Stem configuration slide gates (from 49"x49" to 80x80").

- **Step 1:** Start from closed position.
- **Step 2:** Remove the stem extension pin (item 2) and uncouple the stem extension (item 3) from the slide (item 1). See "Detail A".

NOTE: the stem extension will not fall down as it is a rising-stem configuration slide gate.

- **Step 3:** Unscrew the nuts and washers (items 8 and 9) of stem guide (item 7).
- **Step 4:** Unscrew the nuts and washers (item 5 and 6) of floor stand (item 4).
- **Step 5:** Move the set Floor Stand and Stem Extension (items 3 and 4) in order to be able to remove the slide (item 1).
- **Step 6:** Remove the slide (item 1) from the frame.
- **Step 7:** Unscrew bolts and nuts (items 12 and 13) from the retainers (items 10 and 11).
- **Step 8:** Remove seal (item 14) and replace it by the new seal.

Note 1: Apply glue where the bottom seal and side seals join.

Note 2: After installing the new seal, apply grease on it to ease operation.

Reassembly:

- Follow Steps 8 to 1.

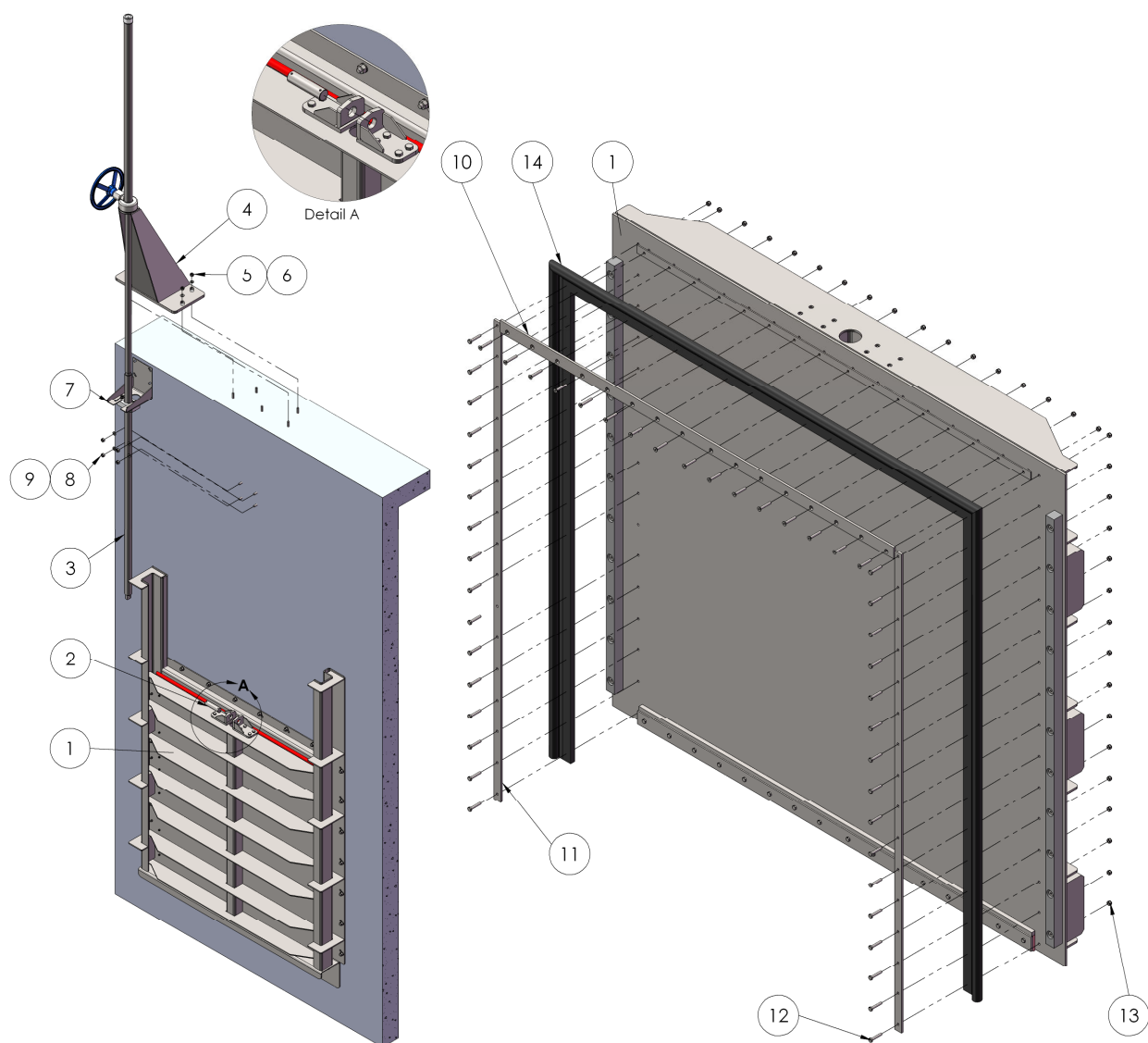
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MAINTENANCE: SEAL REPLACEMENT (MU 49"X49" TO 80"X80")

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MAINTENANCE: SEAL REPLACEMENT (MU 49"X49" TO 80"X80")

Seal replacement procedure for Self-Contained and Non-Rising-Stem configuration slide gates (from 49"x49" to 80x80").

- **Step 1:** Start from closed position.
- **Step 2:** Unscrew bolts and nuts (items 3 and 4) that hold the couplings (item 2) in place. See "Detail A".
- **Step 3:** Unscrew the bolts and nuts (items 6 and 7) from the yoke (item 5).
- **Step 4:** Remove the Yoke and Stem (items 5 and 8) as one unit.
- **Step 5:** Remove the stem extension (item 9).
- **Step 6:** Remove the slide (item 1) from the frame.
- **Step 7:** Unscrew bolts and nuts (items 12 and 13) from the retainers (items 10 and 11).
- **Step 8:** Remove seal (item 14) and replace it by the new seal.

Note 1: Apply glue where the bottom seal and side seals join.

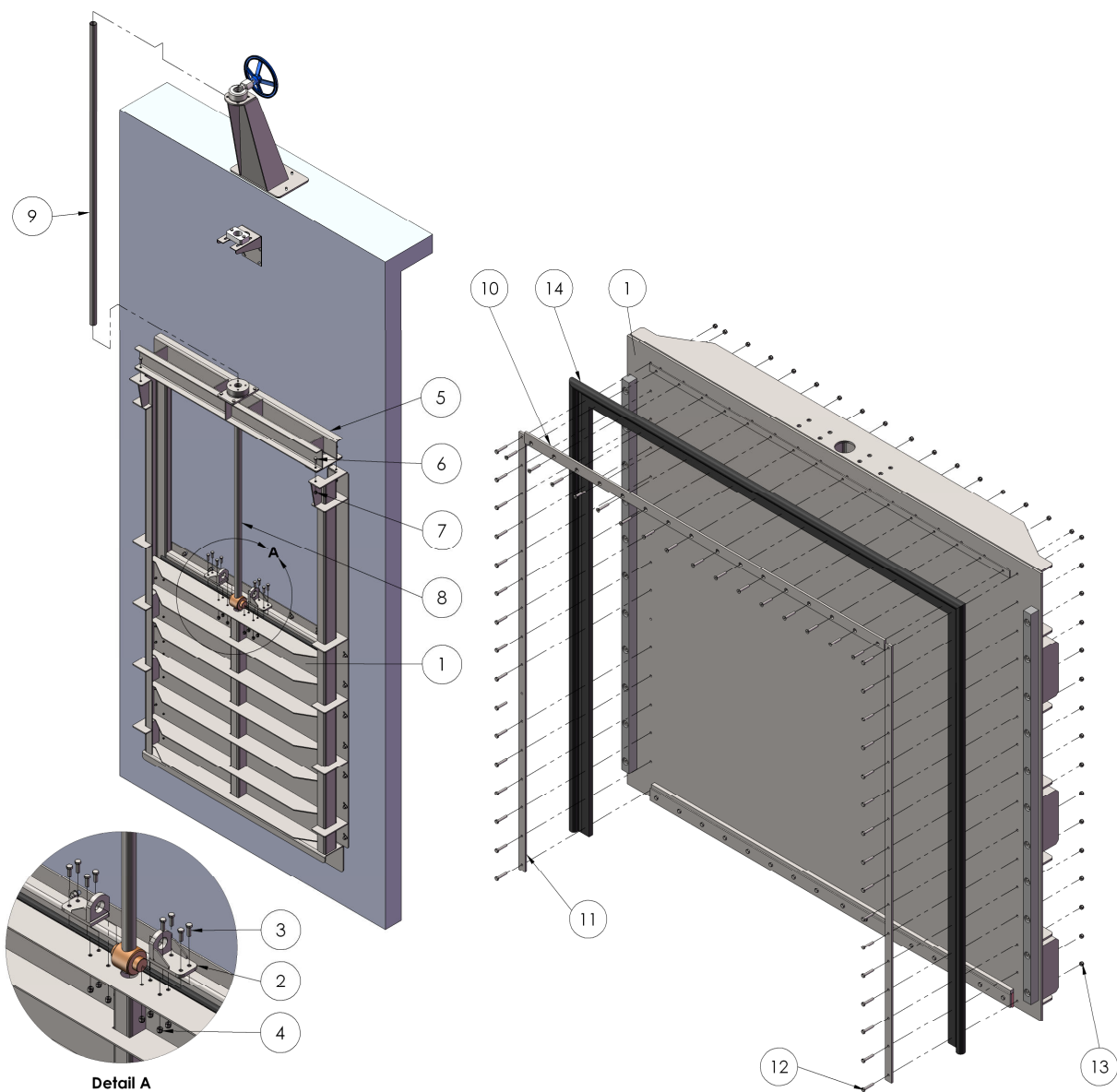
Note 2: After installing the new seal, apply grease on it to ease operation.

Reassembly:

- Follow Steps 8 to 1.

MAINTENANCE: SEAL REPLACEMENT (MU 49"X49" TO 80"X80")

continued



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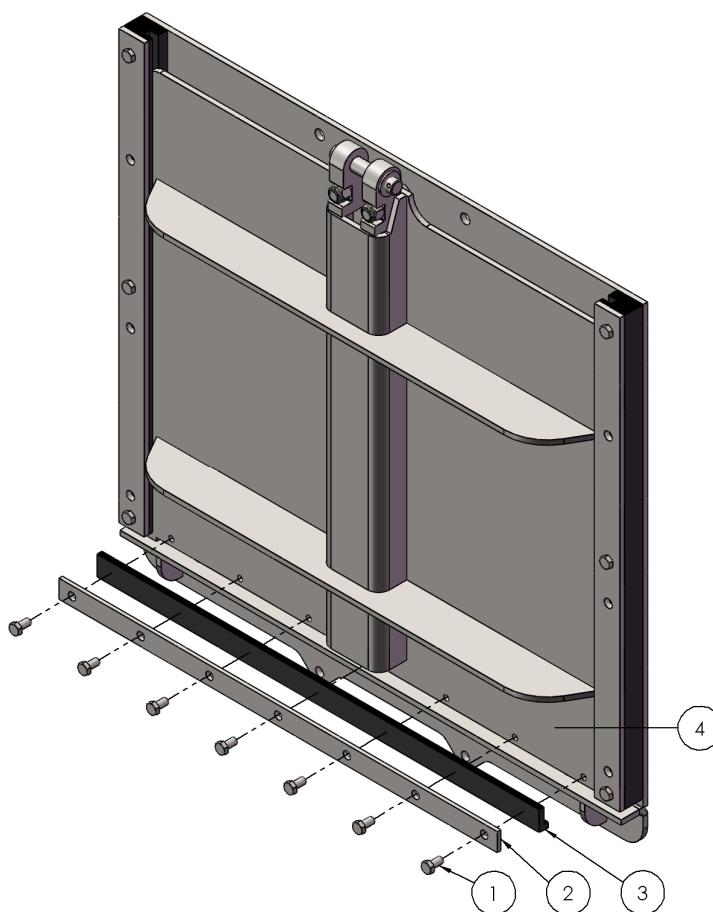
MAINTENANCE: BOTTOM SEAL REPLACEMENT (MU 8"X8" TO 48"X48")

Bottom seal replacement procedure*:

- **Step 1:** From the closed position, raise the slide (item 4), around 2".
- **Step 2:** Unscrew bolts (item 1) and remove the bottom retainer (item 2).
- **Step 3:** Replace the bottom seal (item 3).

Reassembly:

- Follow Steps 3 to 1.



* The figure shows the slide gate removed from the wall in order to ease the identification of the different parts. However, there is no need to remove the frame or the slide from the wall to replace the bottom seal.

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MAINTENANCE: BOTTOM SEAL REPLACEMENT (MU 49"X49" TO 80"X80")

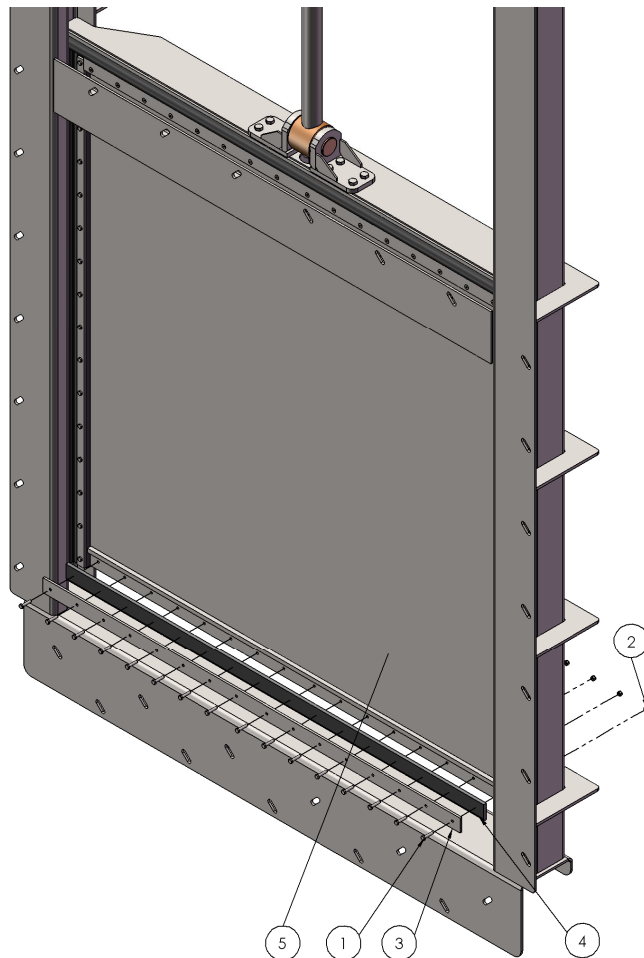
Bottom seal replacement procedure*:

- **Step 1:** From the closed position, raise the slide (item 5), around 2".
- **Step 2:** Unscrew bolts and nuts (item 1 and 2) and remove the bottom retainer (item 3).
- **Step 3:** Replace the bottom seal (item 4).

Note: Apply glue where the bottom seal and side seals join.

Reassembly:

- Follow Steps 3 to 1.



* The figure shows the slide gate removed from the wall in order to ease the identification of the different parts. However, there is no need to remove the frame or the slide from the wall to replace the bottom seal.

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INSTALLATION, OPERATION AND MAINTENANCE MANUAL		02-2010 Edition Revision- A
MODEL	MU SLIDE GATES	 ORBINOX <small>VALVE SOLUTIONS IN MORE THAN 70 COUNTRIES</small>

TROUBLE SHOOTING

SYMPTOM	CAUSE	SOLUTION
<ul style="list-style-type: none"> Leakage between slide gate and concrete wall 	<ul style="list-style-type: none"> Concrete wall does not meet the required std. 	<ul style="list-style-type: none"> Un-install the slide gate and fix the wall.
	<ul style="list-style-type: none"> Not enough construction sealant. 	<ul style="list-style-type: none"> Un-install the slide gate, clean the wall and apply a new layer of construction sealant.
	<ul style="list-style-type: none"> Loose anchor bolts. 	<ul style="list-style-type: none"> Tighten anchor bolts.
	<ul style="list-style-type: none"> Incorrect anchor bolts. 	<ul style="list-style-type: none"> Check the 'General Arrangement Drawing' and make sure the right anchor bolts have been installed.
<ul style="list-style-type: none"> Leakage through the seal 	<ul style="list-style-type: none"> Damaged seal. 	<ul style="list-style-type: none"> Replace seal.
<ul style="list-style-type: none"> Leakage through the bottom seal 	<ul style="list-style-type: none"> Foreign material trapped between frame invert and slide. 	<ul style="list-style-type: none"> Remove the foreign material. Check if there is any damage to the seal.
	<ul style="list-style-type: none"> Damaged seal. 	<ul style="list-style-type: none"> Replace seal.
<ul style="list-style-type: none"> Excessive force required to operate the slide gate 	<ul style="list-style-type: none"> Misaligned stem extension, stem guide, or floor stand. 	<ul style="list-style-type: none"> Check and adjust alignment of stem extension, stem guide or floor stand.
	<ul style="list-style-type: none"> Dirty stem and/or stem nut. 	<ul style="list-style-type: none"> Clean and lubricate stem and/or stem nut.

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