

MODEL

MU



GENERAL DESCRIPTION

The Orbinox model MU is a 4 sided sealing penstock. The gates are suitable for different types of applications with a highly versatile flow control for waste water treatment plants, irrigation, hydraulic works and hydro-electric power plants.

From sizes 150 mm x 150 mm to 1200 mm x 1200 mm, the MU model has a unique seal design that can achieve minimal equal seating and unseating (bidirectional) leakage rates. Sizes 1300 mm x 1300 mm up to 2000 mm x 2000 mm are available in both uni-directional (only suitable for seating water heads) and bi-directional configurations. The maximum leakage rate is lower than the maximum allowable recommended by DIN 19569-4 (class 5) and AWWA C561-04 under normal conditions. Orbinox also designs and manufactures the MU model penstock in larger sizes, for more demanding service conditions.

For more information please contact an Orbinox representative.



CONSTRUCTION DESIGN

The MU penstock is manufactured in general accordance to DIN 19569-4. Other standards such as AWWA C561-04 and BS 7775 also available.

The standard MU model is manufactured in stainless steel which has a higher corrosion resistance in many applications which results into a longer life cycle with little or no maintenance. Other materials of construction are available upon request, such as AISI 904L, Duplex stainless, etc.



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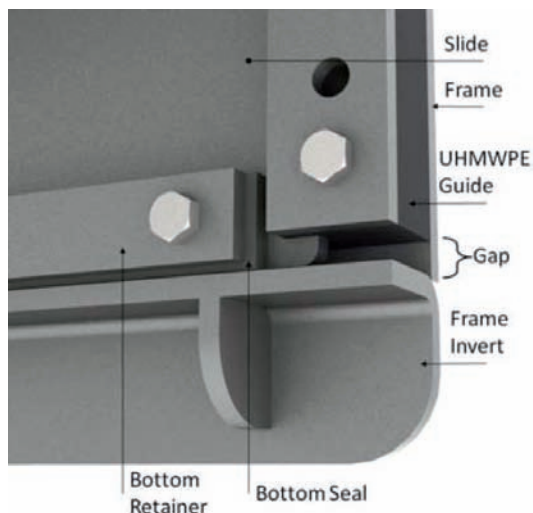
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MU-1

DESIGN FEATURES

- Modular design allows for both Open Frame and Self-Contained configurations.



Self-cleaning guides.

- Frame configuration options:
 - Square (standard)
 - Rectangular
 - Round
- Mounting configuration options:
 - Wall Mount (standard)
 - Standard flange Mount
 - Curved Wall Mount
 - Thimble Mount

- Option of Rising or Non-Rising stem configurations.
- Design allows for elevated or flush bottom installation.
- Suitable for actuation with manual, electric, pneumatic or hydraulic actuators.
- UHMWPE guides for seating and unseating heads, reduces the friction coefficient during operation, minimizing actuation thrust and extending seal life.
- Self-cleaning UHMWPE guides.
- Machined slot for slide on guides to prevent “see-saw” effect when opening and closing the slide.
- The unique seal design is self adjusting.
- Seal and guides bolting is completely separated from the frame anchoring.
- Orbinox penstocks are completely factory assembled and tested eliminating the need for on site adjustment.
- All gate fasteners are stainless steel.

Leakage Allowance:

The leakage rate on MU model is lower than the maximum allowable defined by different standards under normal conditions:

- DIN 19569-4 (class 5): 1,20 l/min per meter.
- AWWA C-561-04: 1.24 l/min per meter.
- BS 7775: 0,5 l/min per meter (for 6 m.w.c.).
0,77 l/min per meter (for 10 m.w.c.).

Seating / Unseating Design Head:

Size	Seating head pressure	Unseating head pressure
MU BI-DIRECTIONAL 150 mm x 150 mm - 1000 mm x 1000 mm	10 meters of water column	10 meters of water column
MU BI-DIRECTIONAL 1100 mm x 1100 mm - 2000 mm x 2000 mm	6 meters of water column	6 meters of water column
MU UNI-DIRECTIONAL 1300 mm x 1300 mm - 2000 mm x 2000 mm	6 meters of water column	0 meters of water column

NOTE: For higher head pressures, please consult an Orbinox representative.

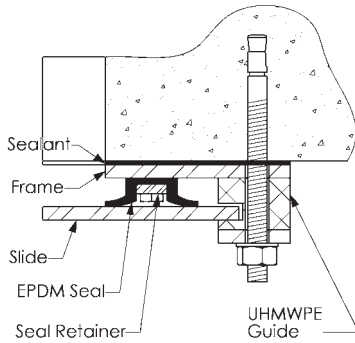
MODEL

MU

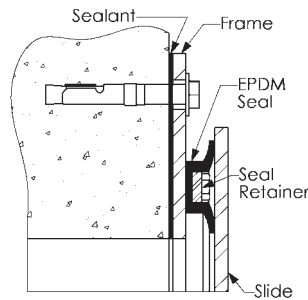
BI-DIRECTIONAL

Seal Design: sizes 150 mm x 150 mm to 1200 mm x 1200 mm

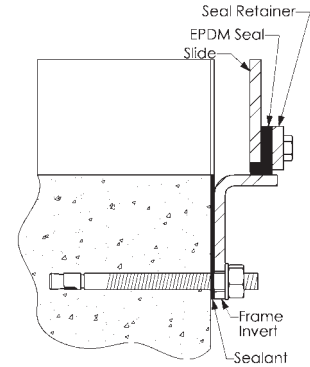
SIDE SEAL



TOP SEAL



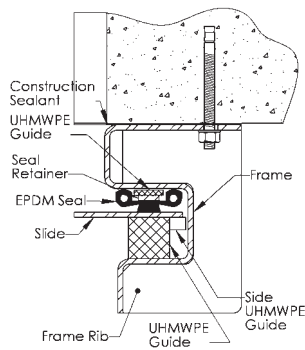
BOTTOM SEAL



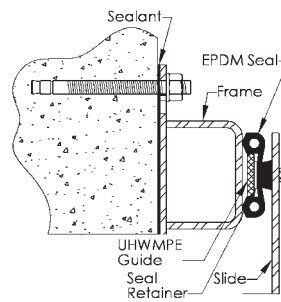
BI-DIRECTIONAL

Seal Design: sizes 1300 mm x 1300 mm to 2000 mm x 2000 mm

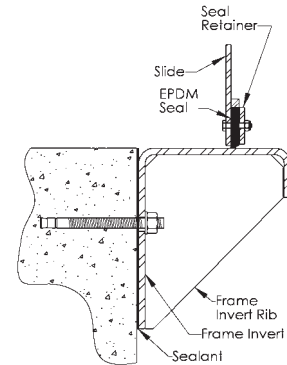
SIDE SEAL



TOP SEAL



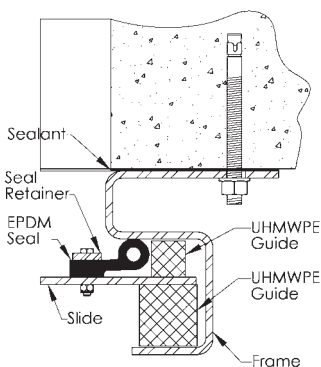
BOTTOM SEAL



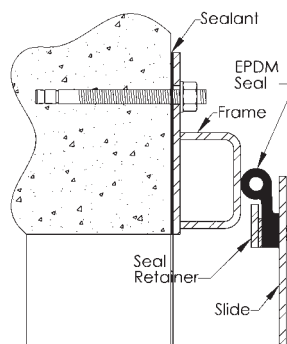
UNI-DIRECTIONAL

Seal Design: sizes 1300 mm x 1300 mm to 2000 mm x 2000 mm

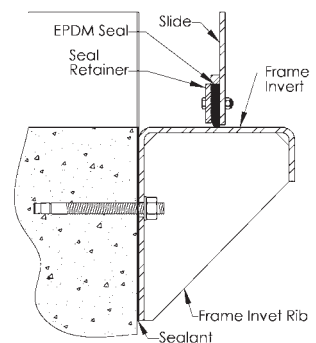
SIDE SEAL



TOP SEAL

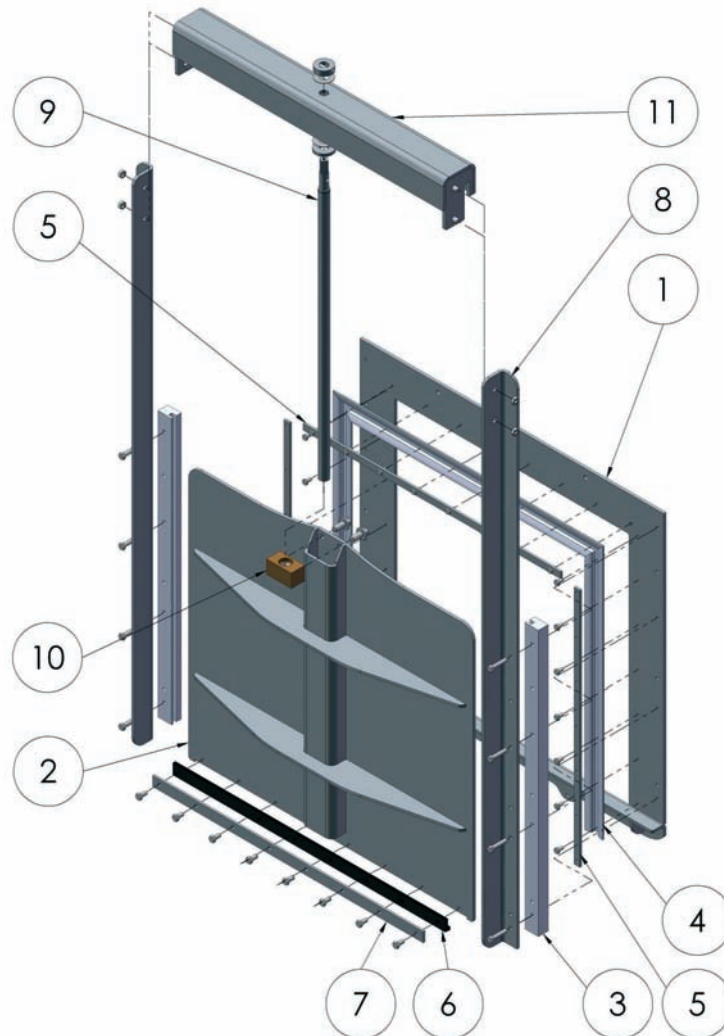


BOTTOM SEAL



STANDARD MATERIALS OF CONSTRUCTION

Sizes 150 mm x 150 mm to 1200 mm x 1200 mm

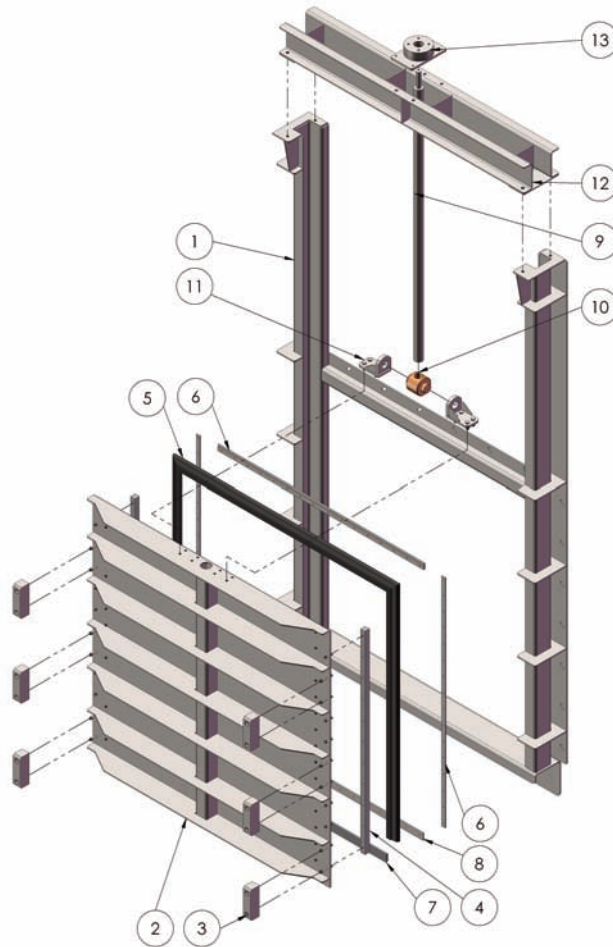


ITEM	DESCRIPTION	MATERIAL (standard)
1	Frame	Stainless Steel Type 304L or 316L (1.4306 or 1.4404)
2	Slide	Stainless Steel Type 304L or 316L (1.4306 or 1.4404)
3	Guides	Ultra High Molecular Weight Polyethylene (UHMWPE)
4	Seal	EPDM
5	Seal Retainer	Stainless Steel Type 304L or 316L (1.4306 or 1.4404)
6	Bottom Seal	EPDM
7	Bottom Seal Retainer	Stainless Steel Type 304L or 316L (1.4306 or 1.4404)
8	Frame Guide	Stainless Steel Type 304L or 316L (1.4306 or 1.4404)
9	Stem	Stainless Steel Type 303 (1.4305), other on request
10	Stem Nut	Bronze
11	Yoke	Stainless Steel Type 304L or 316L (1.4306 or 1.4404)

Note: For materials other than the above, please consult an Orbinox representative.

STANDARD MATERIALS OF CONSTRUCTION

Sizes 1300 mm x 1300 mm to 2000 mm x 2000 mm



ITEM	DESCRIPTION	MATERIAL (standard)
1	Frame	Stainless Steel Type 304L or 316L (1.4306 or 1.4404)
2	Slide	Stainless Steel Type 304L or 316L (1.4306 or 1.4404)
3	Front Guides	Ultra High Molecular Weight Polyethylene (UHMWPE)
4	Guides	Ultra High Molecular Weight Polyethylene (UHMWPE)
5	Seal	EPDM
6	Seal Retainer	Stainless Steel Type 304L or 316L (1.4306 or 1.4404)
7	Bottom Seal	EPDM
8	Bottom Seal Retainer	Stainless Steel Type 304L or 316L (1.4306 or 1.4404)
9	Stem	Stainless Steel Type 303 (1.4305), other on request
10	Stem Nut	Bronze
11	Stem Nut Bracket	Stainless Steel Type 304L or 316L (1.4306 or 1.4404)
12	Yoke	Stainless Steel Type 304L or 316L (1.4306 or 1.4404)
13	Stem Coupling	Stainless Steel Type 304L or 316L (1.4306 or 1.4404)

Note: For materials other than the above, please consult an Orbinox representative.

MODEL

MU



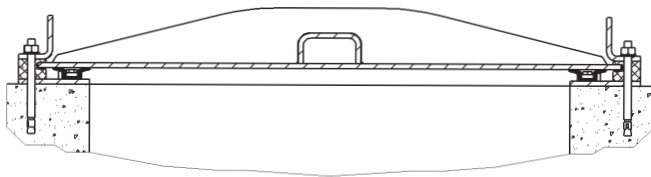
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MOUNTING OPTIONS

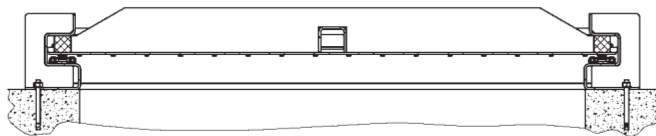
The following drawings show the most common mounting options for MU penstocks. For other types of mounts, please consult an Orbinox representative.

WALL MOUNT (STANDARD)

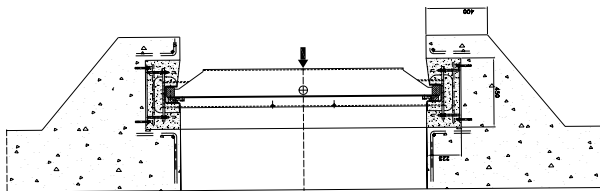
Sizes 150 mm x 150 mm to 1200 mm x 1200 mm



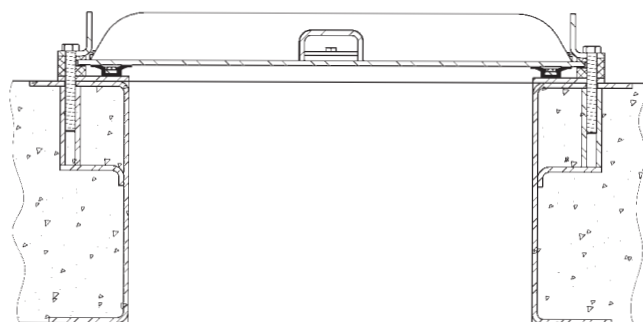
Sizes 1300 mm x 1300 mm to 2000 mm x 2000 mm



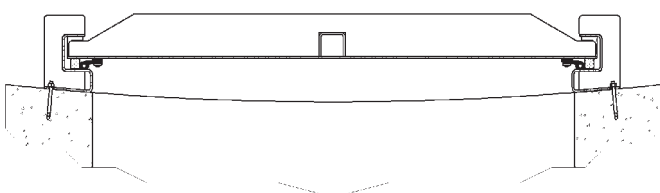
EMBEDDED IN CONCRETE



THIMBLE MOUNT

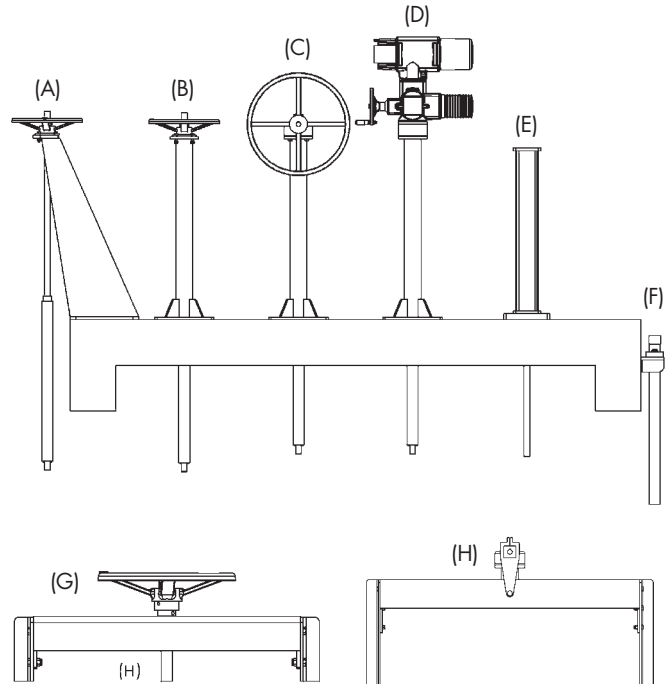


CURVED WALL MOUNT



ACTUATORS

All Orbinox actuators can be yoke or pedestal mounted, below are some examples of the most common types.



Various types of actuators as shown above:

- (A) Handwheel on inclined floor stand.
- (B) Handwheel on straight floor stand.
- (C) Gear operator on straight floor stand.
- (D) Electric actuator on straight floor stand.
- (E) Hydraulic or pneumatic actuator.
- (F) Square nut (ISO 5211) operator (For Non-Rising stem).
- (G) Yoke mounted handwheel.
- (H) Yoke mounted gear and crank.

Accessories:

- Mechanical stops
- Actuator manual overrides
- Locking devices
- Solenoid valves
- Positioners
- Limit / Proximity switches

STEM EXTENSIONS

In many cases, the operating floor level is located substantially higher than the opening. In order to be able to operate the gate, stem extensions are necessary. Stem guides are used to limit the “unsupported” length of the stem extension in order to avoid any buckling failure. The stem guide has a UHWMPE guide to reduce friction between the guide and the extension.

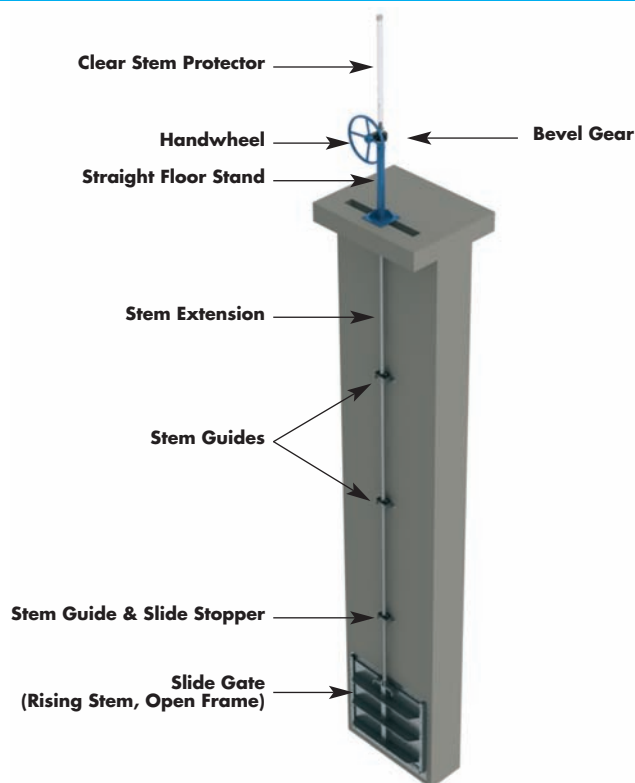
Non-Rising Stem Configuration

As standard, non-rising stem gate configurations are used with self-contained frame designs. Therefore, the stem extension does not support the axial load (only torque) and less wall brackets are required.

As a general rule, a stem guide should be installed every 3 meters of unsupported stem extension.

Rising Stem Configuration

As standard, rising stem gate configurations are used with open-frame designs. Therefore, the stem extension has to support the axial load when the gate is operated. In consequence, the use of stem guides are critical to avoid any buckling failure. As a general rule, a stem guide should be installed every 2 meters of unsupported stem extension.



INSTALLATION, OPERATION AND MAINTENANCE

This section briefly describes the installation, operation and maintenance of MU penstocks. For more detailed information please refer to the “MU IOM Manual”.

Installation:

Orbinox MU penstocks are installed by means of Anchor Bolts. Depending on the size and working conditions they shall be either of the mechanical or chemical type (see table below).

In order to avoid leakage between the concrete wall and the frame, Orbinox recommends the use of construction sealant equivalent to Sikaflex 11FC sealant (200ml per meter of opening perimeter).

The minimum concrete strength shall be 20.7 MPa. The tolerance of the concrete construction (flatness, levelness and plumbness) shall be in accordance to DIN 18202 (table 3, group 6).

For detailed information about type, size and quantity of the required anchor bolts at the installation, please refer to the notes on the “General Arrangement Drawing”.

Maintenance and Operation:

The Orbinox MU penstocks need practically no maintenance. The stem shall be kept lubricated and seals shall be replaced if damaged. The MU penstock is closed by applying a clockwise rotation.

Applying too much force on the operator when closing the gate may cause damage to the stem.

MU Size	Water Pressure	Standard Mounting Type
MU BI-DIRECTIONAL 150 mm x 150 mm - 1200 mm x 1200 mm	Seating and Un-Seating (Bi-Directional)	Wall mount: • Stud Type Mechanical Anchor Bolts • Bolt Type Mechanical Anchor Bolts
MU BI-DIRECTIONAL 1300 mm x 1300 mm - 2000 mm x 2000 mm	Seating and Un-Seating (Bi-Directional)	Wall mount: • Chemical Anchor Bolts Embedded in concrete
MU UNI-DIRECTIONAL 1300 mm x 1300 mm - 2000 mm x 2000 mm	Seating (Uni-Directional)	Wall mount: • Stud Type Mechanical Anchor Bolts

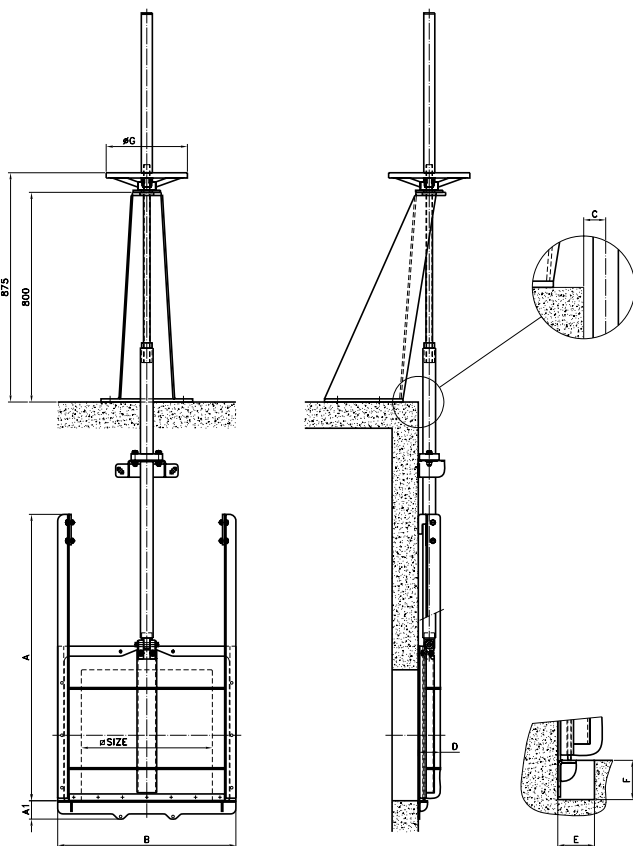
MODEL

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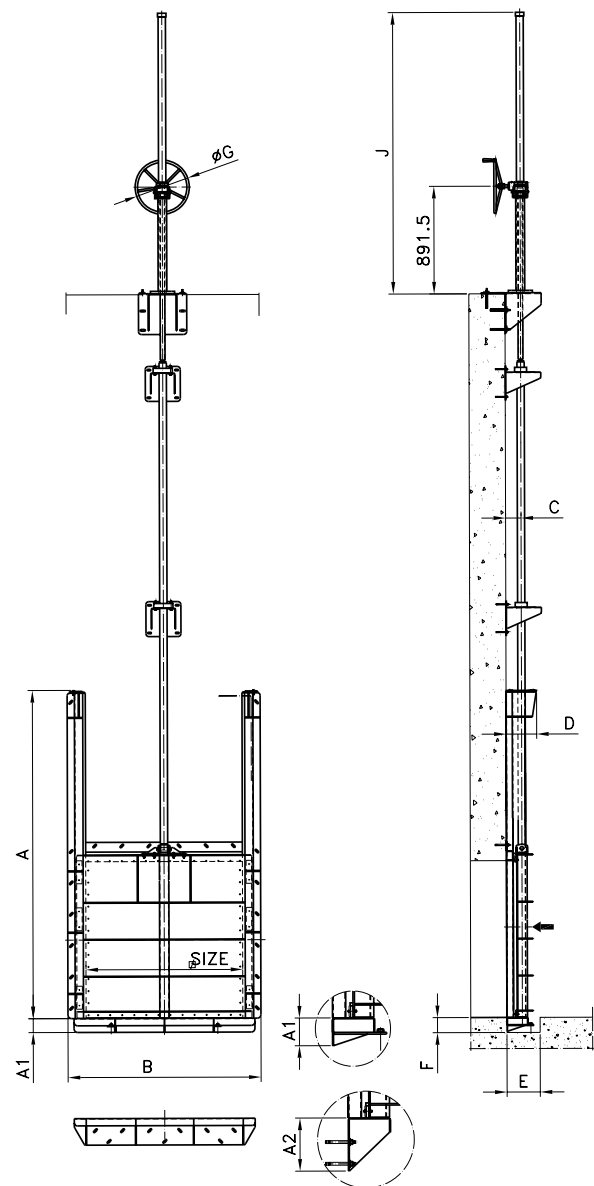
The following drawings show the most common frame and stem configurations and their dimensional charts. Note that any frame (open and self-contained), stem (rising and non-rising) and actuator combination can be manufactured for MU penstocks.

OPEN FRAME - RISING STEM - DIMENSION

SIZES: 150 mm x 150 mm to 1200 mm x 1200 mm



SIZES: 1300 x 1300 mm to 2000 x 2000 mm



OPEN FRAME - RISING STEM - DIMENSION

SIZES: 150 mm x 150 mm to 1200 mm x 1200 mm

SIZE (mm) (opening)	A	B	A1	C	D	ØG	E x F
200x200	290	380	70	41	82	225	70x75
300x300	390	480	70	41	82	225	70x75
400x400	490	580	70	42	85	310	70x75
500x500	590	680	70	42	85	310	70x75
600x600	690	780	70	42	115	310	70x75
700x700	790	880	70	42	115	310	70x75
800x800	890	980	70	42	125	310	70x75
900x900	1000	1100	82	56	136	410	70x85
1000x1000	1100	1200	82	56	136	410	70x85
1100x1100	1250	1300	82	56	136	410	70x85
1200x1200	1350	1400	82	56	136	410	70x85

SIZES: 1300mm x 1300 mm to 2000mm x 2000 mm

BI-DIRECTIONAL

SIZE (mm) (opening)	A	B	A1	A2	C	D	J	ØG	E x F
1300x1300	2725	1650	115	220	145	275	2350	450	280x150
1400x1400	2925	1750	115	220	145	275	2450	450	280x150
1500x1500	3125	1850	115	220	145	275	2550	450	280x150
1600x1600	3325	1950	115	220	145	275	2650	650	280x150
1700x1700	3525	2050	115	220	145	275	2750	650	280x150
1800x1800	3725	2150	115	250	145	275	2850	650	280x150
1900x1900	3925	2250	115	250	145	275	2950	650	280x150
2000x2000	4125	2350	115	250	145	275	3050	650	280x150

UNI-DIRECTIONAL

SIZE (mm) (opening)	A	B	A1	A2	C	D	J	ØG	E x F
1300x1300	2725	1610	115	220	145	275	2350	450	280x150
1400x1400	2925	1710	115	220	145	275	2450	450	280x150
1500x1500	3125	1810	115	220	145	275	2550	450	280x150
1600x1600	3325	1910	115	220	145	275	2650	650	280x150
1700x1700	3525	2010	115	220	145	275	2750	650	280x150
1800x1800	3725	2110	115	250	145	275	2850	650	280x150
1900x1900	3925	2210	115	250	145	275	2950	650	280x150
2000x2000	4125	2310	115	250	145	275	3050	650	280x150

Note: For dimensions other than above, please contact an Orbinox representative.
These dimensions are for information only. Do not use for installation or submittal purposes.

MODEL

MU

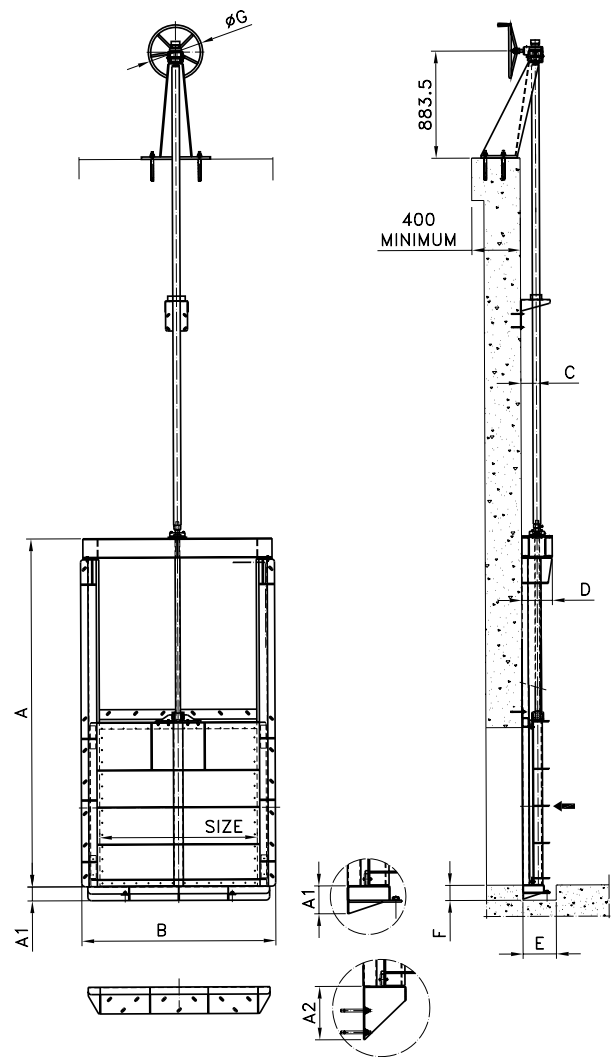
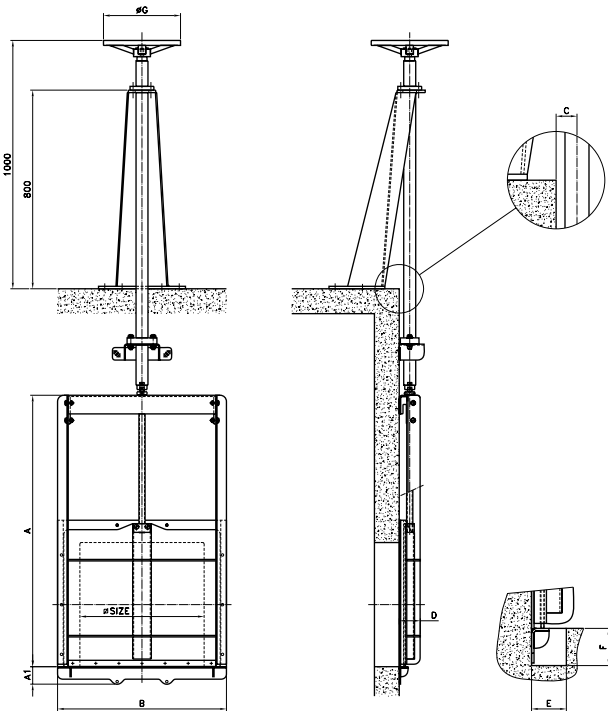


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CLOSED FRAME - NON RISING STEM - DIMENSION

SIZES: 150 mm x 150 mm to 1200 mm x 1200 mm

SIZES: 1300 mm x 1300 mm to 2000 mm x 2000 mm



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MU-10

CLOSED FRAME - NON RISING STEM - DIMENSION

SIZES: 150 mm x 150 mm to 1200 mm x 1200 mm

SIZE (mm) (opening)	A	B	A1	C	D	ØG	E x F
200x200	492	380	70	41	82	41	70x75
300x300	692	480	70	41	82	41	70x75
400x400	893	580	70	42	85	42	70x75
500x500	1093	680	70	42	85	42	70x75
600x600	1294	780	70	42	115	42	70x75
700x700	1496	880	70	42	115	42	70x75
800x800	1696	980	70	42	125	42	70x75
900x900	1976	1100	82	56	136	42	70x85
1000x1000	2176	1200	82	56	136	42	70x85
1100x1100	2389	1300	82	56	136	42	70x85
1200x1200	2589	1400	82	56	136	42	70x85

SIZES: 1300 mm x 1300 mm to 2000 mm x 2000 mm

BI-DIRECTIONAL

SIZE (mm) (opening)	A	B	A1	A2	C	D	ØG	E x F
1300x1300	2916	1650	115	220	145	275	450	280x150
1400x1400	3116	1750	115	220	145	275	450	280x150
1500x1500	3316	1850	115	220	145	275	450	280x150
1600x1600	3528	1950	115	220	145	275	650	280x150
1700x1700	3728	2050	115	220	145	275	650	280x150
1800x1800	3988	2150	115	250	145	275	650	280x150
1900x1900	4188	2250	115	250	145	275	650	280x150
2000x2000	4458	2350	115	250	145	275	650	280x150

UNI-DIRECTIONAL

SIZE (mm) (opening)	A	B	A1	A2	C	D	ØG	E x F
1300x1300	2871	1610	115	220	145	275	450	280x150
1400x1400	3071	1710	115	220	145	275	450	280x150
1500x1500	3271	1810	115	220	145	275	450	280x150
1600x1600	3483	1910	115	220	145	275	650	280x150
1700x1700	3683	2010	115	220	145	275	650	280x150
1800x1800	3943	2110	115	250	145	275	650	280x150
1900x1900	4143	2210	115	250	145	275	650	280x150
2000x2000	4413	2310	115	250	145	275	650	280x150

Note: For dimensions other than above, please contact an Orbinox representative.
 These dimensions are for information only. Do not use for installation or submittal purposes.

MODEL

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MU PENSTOCK SELECTION FORM

Customer: Tag No.: Date: Order Number: Qty.:

PENSTOCK DESIGN

Units: mm inch Size Wall Opening Width: Wall Opening Height:

Seating Water Head: Unseating Water Head: Invert to Operating Floor height:

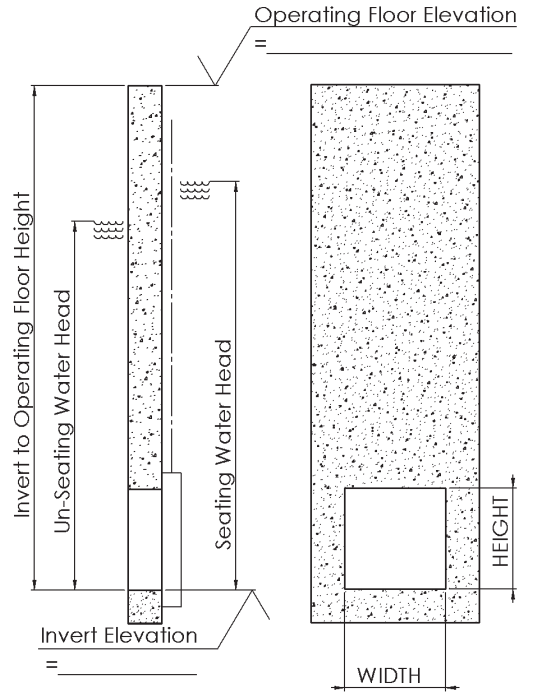
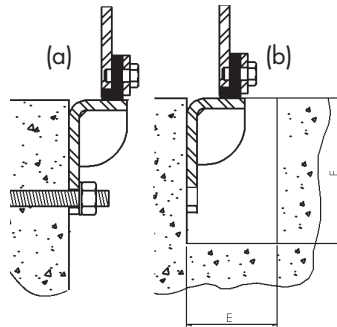
- Non Rising Stem Uni-Directional Closed Frame Rising Stem Bi-Directional Open Frame

PENSTOCK MOUNTING

- Concrete Wall Mount Wall thimble Mount Embedded In Concrete

Frame Invert Mounting:

- Standard Wall Mount (a) Flush Bottom Mount (b) E= F=

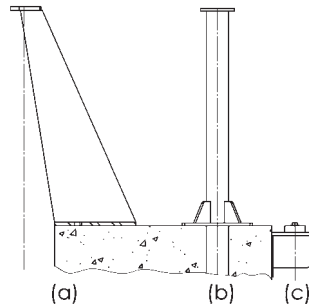
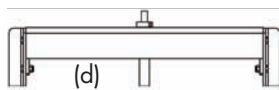


ACTUATORS

- Handwheel Crank Square Nut - ISO 5211 Bevel Gear Electric Motor Pneumatic Cylinder Hydraulic Cylinder

Actuator Mounting:

- Inclined Floor Stand (a) Straight Floor Stand (b) Wall Bracket (for Sqr.Nut)(c) Frame Mounted (d)



Position Indicator:

- (For RS Only) Position Label Limit Switch Proximity Switch

MATERIALS

- Frame & Slide Stem Extension Floor Stand Seal Stem Cover 304L SS 303 SS 304L SS Carbon Steel Carbon Steel 304L SS 316 SS 304L SS 304L SS Other: Other: Other: Other: Other: Other:

REMARKS

Name: Signature: