AQUIKO

Operation & Maintenance Manual

APS-PE PENSTOCK

Aquatic Control Engineering Ltd trading as AQUIKO

Contents

Introduction and Purpose

Aquatic Control Engineering (ACE) are specialist suppliers and installers of water flow control equipment. Aquatic Control Engineering Ltd is trading as AQUIKO.

This document sets out the requirements and procedures for the installation, operation and maintenance of the AQUIKO ARF Flap Valve. Aquatic Control Engineering conforms to UK CA certification (where applicable*) and compliance to BS7775. ACE conforms and is accredited to ISO 9001 Quality and ISO 45001 Occupational Health and Safety Management systems; alongside a variety of industry standards and ISO 14001 Environmental Management Systems in place.

The AQUIKO ARF Flap Valve is designed to act as a passive flood prevention device, in the form of a non-return valve. The flap valve is placed over outfalls to allow virtually free flow in the intended direction, but prevent return flow as the outfall level rises.

This manual is specifically for the ARF Flap Valve 100-1500mm. The operative installing must ensure they understand this manual prior to commencing installation works. Any purchase of a different size, outside of this product range, should seek further advice from Aquatic Control Engineering prior to commencing any works for installation; your product may require specific instructions.

The APS-PE is fitted as standard with a non-rising spindle, with a Polyacetal nut block, meaning that it does not need greasing, even after a long period of no use. The penstock can be relied upon even during infrequent use; this is particularly useful in secondary protection, emergency shut off and maintenance isolation applications. The material remains suitable, however for regular use, so it can be used in many other more arduous conditions.

*** NB:** In some cases, particularly where actuated after installation, the installer may be responsible for UK-CA certification of the incorporated system. Please contact ACE if you require advice on this.

Technical and Material specifications (summary)

The APS-PE is manufactured using a combination of High Density Poly Ethylene (HDPE) and Stainless Steel 316, ensuring the equipment is:

- Very robust, yet much lighter than comparable strength materials
- Low friction (coupled with lighter weight) allows much lower force required to operate
- Suitable for harsh environments, including sewage and seawater
- UV stable, recyclable and low - carbon - long lasting
- Virtually maintenance free; see the maintenance section of this manual
- Available within a range of operation options and drive variants.

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Safety Considerations

The operative installing must ensure all the correct safety precautions have been taken into account before starting. All legal regulations must be adhered to prior to commencing any works.

Installation should only be carried out by a skilled and qualified person and they must ensure they are working under HSE guidance and rules, along with wearing the correct PPE and using the correct, tested and inspected equipment. Provision of a suitable safe system of work is the responsibility of the installing party.

When lifting is required, the operative installing should ensure they are fully trained in using lifting equipment and ensure a safe working method is adhered to at all times. If slings are required, the operative must ensure they are fully competent and qualified in line with LOLER regulations.

It is advised a risk assessment is completed and understood by the installer prior to commencing works. Risk management and safety precautions should be put in place by the operative installing.

Common safety considerations also include:

- Prevention of unauthorised access and vandalism/theft
- Prevention of trapping during hoisting/maintenance
- General construction installation hazards
- If actuated, guards, emergency stops and isolation should all be installed as appropriate.

If in doubt, please contact Aquatic Control Engineering (ACE) for copies of the design-risk assessment (DRA-APS-PE) for advice on suitable control measures.

Storage and handling of goods

Please also see Terms and Conditions of Sale regarding responsibility of storage and transport. This product should be transported on a suitably sized pallet relating to the size of the Penstock. The product should be moved horizontally only and may require correct lifting equipment.

Prior to installation, the APS-PE should be stored on a suitably sized pallet, supported flat on a horizontal surface, and away from sources of damage, contamination and tampering.

Fixings that are supplied may also be provided in perishable containers (e.g. boxes) where these should be stored in dry conditions, away from contamination, taking special attention to keep away from other metals.

When handling goods, the equipment should be lifted either flat on a pallet (as delivered) or using the designated lifting point at the top of the spindle.

Warranty

Please see Aquatic Control Engineering's terms and conditions of sale. Warranty will be reviewed providing:

- The equipment is installed, operated and maintained as per the AQUIKO Operation and Maintenance Manual provided
- The equipment is not misused, vandalised or over-loaded; refer to Damage In Transit within terms and conditions of sale

Installation of the APS-PE Penstock

The below set of guidelines should be followed in the manner it is written

Clean and check the mounting surface:

a. For sealing, this should be within a 2-3mm tolerance per metre and any pockets or lumps needs to be resolved, prior to installation
b. The surface should be vertical
c. Clean and, where possible, dry the surface to remove dirt and grease
d. Check all dimensions to ensure correct fit, prior to installation.

Prepare the APS-PE for Installation:

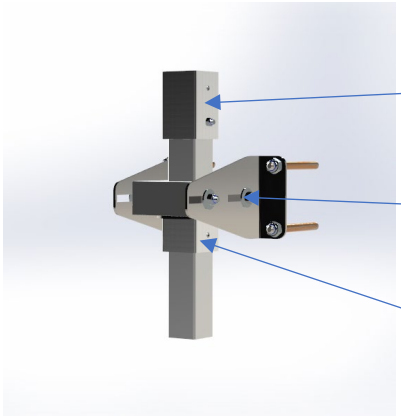
a. Position the APS-PE in place over the outfall, with the inverts of the outfall and APS-PE backplate aligned
b. Ensure the APS-PE is level and vertical and secure to prevent movement
c. Mark the mounting holes on the wall
   Note: We always recommend starting with the top corner fixings, and installing these bolts. This prevents movement of the APS-PE when marking the other holes.
d. Clean the surface of the APS-PE back plate to remove dirt, grease and water
e. Apply sealant in a continuous 5mm bead around the opening and around the fixing holes (take care not to smear this when moving the APS-PE into position)
f. Re-position the APS-PE as before, and install the top corner anchors as per the resin manufacturer's instruction (enclosed with fixing kit)
g. Continue to install the remaining side frame anchors in the wall
h. To ensure a good seal, check that no resin has exited the fixing hole; remove any resin that would prevent the frame sitting flat to the wall
i. Once cured, secure the APS-PE to the wall using a washer, spring washer and nut on each bolt
j. Tighten all fixings evenly, to the recommended torque.
   Note: On larger flaps, the fixings may require multiple tightening as the seal is compressed.
k. Place the plugs in the holes of the invert and soffit beams, and secure using the screw-anchors.

Accessories/Operation Options:

There are various options that are available for use with the APS-PE Penstock; these are often also used in combination with each other. If in doubt, please contact an Aquatic Control Engineering representative.

Spindle extensions

These are commonly used to place the operation point of the penstock at a comfortable level for operation, and can be used with AQUIKO removable keys and all pedestals.



Above: Top bracket detail, Left: 2 sections of spindle extension with brackets

To confirm the length of the spindle extension required, measure between the top of the penstock and the point you wish to operate the penstock at:

- For T and S Key operations, this is at floor level
- For actuated or handwheel operations (any with a pedestal) this is at the top of the pedestal.

Installation of Spindle Extension

NOTE: When fitting the top bracket of spindle extension, a locking ring is placed 2mm below the top bracket to prevent the items working loose (see point g below).

a) Position the first section of spindle extension onto the operation point of the penstock and align vertically in both planes.
b) Position the bracket at 150mm from the top of the extension.
c) Mark and drill the mounting holes for the brackets onto the wall, and fix using resin anchors (follow resin manufacturer's instructions, delivered with the fixing kit).
d) Adjust the guide block on the bracket to ensure the extension remains vertical and central to the penstock.
e) If multiple sections are used, join these together using the extension joint, using the through bolt, and lock using the grub screw.
f) Repeat steps a-e as required.
g) Position and secure the locking ring 2mm below the top bracket- this stops the extension stem from being removed.
h) At the top of the extension, fit a final extension joint to accept your operation selection.

Manual Key operation options

The T key and S Key options can be used either on the penstock itself or on a spindle extension. The items are placed onto the operation point and turned manually as required. These are only suitable up to a 600mm diameter due to water pressure and operation force required, but are ideal for infrequent use or remote sites.

Pedestal options

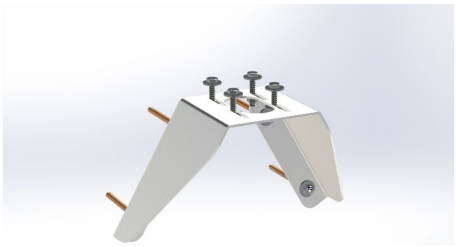
Pedestals are used to position the operation point around waist height (900mm), to make it comfortable and safe for operation at ground level.

All pedestal options are available for floor mounting or wall mounting, and on larger sizes, with a Torque Booster, allowing wider use of handwheels and manual drives.

Left: Floor mounted column, with Fascia Plate

Right: Floor mounted column, with Fascia plate removed, showing Torque Booster option.

Below: Additional bracket to allow wall mounting



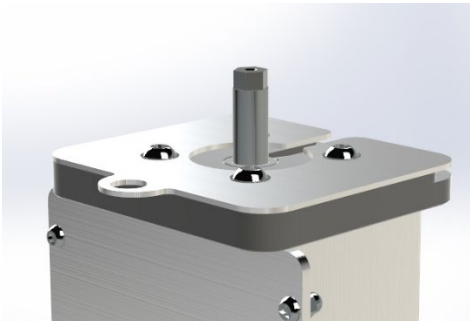
All pedestals are fitted with a base plate that can accept any of the AQUIKO operation accessories, which prevents the collection of water and allows the operation point to be locked using an optional locking cap if required.

Installation of Pedestal

a) Complete the installation of the spindle extension, and attach a further section of extension to interface with the pedestal.
b) Remove fascia plate and retain fixings.
c) If wall mounted, position the wall mounting bracket at the top of the wall, with the spindle extension vertical.
d) Mark and drill the mounting holes for the bracket onto the wall, and fix using resin anchors (follow resin manufacturer's instructions, delivered with the fixing kit).
e) Adjust the guide block on the bracket to ensure the extension remains vertical and central to the penstock.
f) Cut the extension to length:
   Without Torque Booster: 850mm from floor
   With Torque Booster: 695 from floor
g) Attach extension joint to the top extension piece with through bolt and loosen grub screw.
h) Place the pedestal over the spindle extension, connecting to extension.
i) Align with spindle extension so it remains vertical, and mark mounting holes for fixings inside pedestal. (If using wall bracket, attach to wall bracket at this point with through bolts to secure).
j) Mark and drill the mounting holes, and fix using resin anchors (follow resin manufacturer's instructions, delivered with the fixing kit).
k) Check operation is smooth and concentric.
l) Attach fascia plate, and mark mounting holes.
i) Using the flush fitting anchors (to allow removal of fascia plate after installation) mark and drill the mounting holes for the brackets onto the wall, and insert anchors (follow resin manufacturer's instructions, delivered with the fixing kit).
m) Secure the fascia plate using the supplied bolts.

Drive options

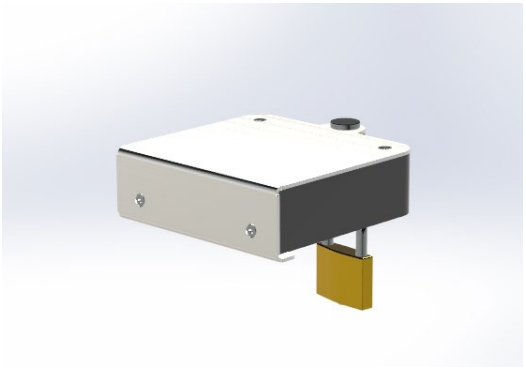
Pedestal variants can be used with fixed and removable handwheels as well as battery drivers in some cases, and all are available with locking systems on request.



Left- Universal drive shaft (always supplied)- can be used with 17mm socket, drill drive or AQUIKO accessories. Also shows anti-pooling base plate and locking pin facility

Below left: Optional locking cover

Below right: Handwheel with crank, with optional locking pin facility



For installation/configuration advice regarding the operation options, please contact an Aquatic Control Engineering representative.

Actuators

AQUIKO Penstocks can also be used with a wide range of gearbox and actuation options, including electric, rack and pinion and hydraulic drive systems. For more information, please contact ACE.

Cleaning and Maintenance

The APS-PE is designed to require minimal maintenance, so no greasing is required. Grease can attract dirt and reduce the lifespan of the equipment. It is therefore initially advised to operate the APS-PE penstock annually to fully open and closed cycle.

NB: Each application requires site specific assessment relating to frequency of maintenance

The APS-PE 100-1500 range, requires occasional visual inspection only, to check for damage, obstruction etc. In certain environments, it may also require cleaning to prevent build up that could cause obstruction.

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To clean the equipment, use clean water and a stiff brush.

Cleaning and Maintenance is not included in the purchase.

Disposal

Aquatic Control Engineering work to ISO 14001 Environmental standards and advise all AQUIKO Products are disposed of in an environmentally friendly manner. Where possible, Reduce, Reuse and Recycle methods should apply. Different materials should take into consideration environmental factors and be disposed of using recognised methods.

1. Remove the equipment and sort materials into groups
2. Dispose of all metallic items via registered scrap dealer for recycling
3. Dispose of all recyclable materials via registered carriers/local recycling. (HDPE can be recycled into reusable material, however used in its pure form in this construction for strength).