

KWT Waterbeheersing

Technical Installation & Operation Manual

KWT Pull up weir Penstock

Type KOAS I & II



2004 KWT® Waterbeheersing BV

Supplied by:



AQUATIC
CONTROL
ENGINEERING LTD

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Foreword:

All products are designed and constructed according to the specifications as written in the order confirmation. Never use the product for any other means or applications than stated. This could result in premature failure of the product or risk the safety of personnel. Without any exception, the products are not designed to bear or carry any loads of the civil construction

KWT products will be virtually drop-tight at their working pressure if installation has been carried out correctly. A better seal can be expected at applications with on seated pressure. The responsibility of drop-tight installation lies primarily with the installing contractor.

Phrases in this manual which need special attention are marked as follow:

- ☞ Gives the user suggestions and tips to carry out instructions more easily.
- Remarks, with additional information.
- Informs user of possible problems.

- ☹ The user can cause serious injury to himself or others or can damage the product.

⚠ When the KOAS slide is supplied with or retrofitted with an actuator, the complete system should meet the machinery guide lines.

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1. Introduction

1.1 Product

General

The KOAS type weir penstock is available in two forms; the KOAS I, fitted with a single spindle, and the KOAS II, with two spindles coupled by a common shaft. The KOAS I is fitted with a non rising spindle as standard, however it is also available with a rising spindle. In general KOAS type penstocks are fitted with Polyacetol Spindle blocks, however in heavy duty, modulating or rising duties, these are replaced with Phosphor Bronze blocks or bushes.

The KOAS penstocks are available for wall mounting, channel mounting to the channel walls and channel mounting within a rebate. In all cases, the penstocks are supplied with EPDM sponge seal to seal between the concrete and penstock frame, which is compressed during installation.

Purpose of usage & Principle of functioning

The purpose of the KOAS is to withhold a level of water upstream, and can therefore be used for isolation purposes, however when the water level raises, the penstock can be lifted to discharge the water, and can also be used for water level regulation, including modulating duty. As the KOAS is designed to be a weir penstock, in it's fully closed position, water is allowed to discharge over the plate, and can therefore be designed to suit a typical weir level which can be adjusted in high flow conditions.

The KOAS is well suited for applications involving surface water, waste water plants, sewage systems etc. The KOAS can be supplied for manual or electrical operation.

Installation & operation stipulations

Read this instruction guideline carefully before installing the KOAS.

Make sure you have taken all necessary safety precautions into account before starting. All legal and local regulations have to be followed precisely.

Installation of the KOAS should be only be carried out by skilled and therefore qualified personnel only. In case of any doubt, please contact the supplier immediately

1.2 Technical specifications

Materials of Construction	
Weir plate	AISI 316L or 304
Profiles	AISI 316L or 304
Frame	AISI 316L or 304
Spindle	AISI 316L
Weir Plate Guides	HDPE
Sealing	EPDM Seal compound
Spindle Block	POM(Polyacetol)/ Phoshor Bronze

Table 1: Technical specifications

2. Safety

2.1 General

In this chapter all safety precautions of the KOAS are discussed. It is most important that everybody who operates the pull up weir is familiar with the contents of this chapter.

The most significant risks involving mounting and operating of the KOAS are mentioned in paragraph 2.2. In paragraph 2.3 please adhere to the following safety precautions. All personnel must comply with the installing contractor's safety policies.

2.2. Safety, Health and environmental Risks

The following risks should be regarded:

- Danger of trapping of body parts/clothing when mounting or operating.
- Electrical dangers during mounting or maintenance.
- Falling during hoisting.

2.3 Safety precautions if applicable.

- Unsafe situations or defects should reported to the responsible person.
- Make sure that the power supply to the actuator has been isolated during installation or maintenance.
- Qualified personnel should only carry out Electrical and mechanical work
- Wear all necessary P.P.E. Secure all loose clothing/hair before operation.

3. Transport and storage

3.1 Transport:

The KOAS is to be transported with the weir plate facing up on a pallet of matching size. KOAS can be lifted with suitable "soft" slings. The slings must only be placed on the lifting points provided.

-  All necessary lifting should be carried out by fully trained personnel
-  Only lift the KOAS with lifting slings and a lifting bar.

3.2 Storage

It is recommended to store the KOAS flat, free of dust, dirt and moisture.

4. Installation & Erection

4.1 General

This chapter describes how the KOAS should be taken into operation. In this manual the installation with chemical anchor bolts and with jacking bolts is also described. In the paragraph 4.3 and 4.4 the installation is explained step by step. In paragraph 4.5 the required actions prior to operation are described.

Warranty

It is the responsibility of the purchaser to inspect the supplied KWT products for possible defects and that all ordered items are present at arrival. Missing parts or defects should be reported to KWT immediately and not installed until the problem is rectified. The warranty will be deemed void if:

- The items supplied are not installed in the manner set out in this manual
- The products are modified in any way without the prior approval of the supplier/manufacturer
- The items are damaged due to mis-use, vandalism or overload.

All claims for warranty are subject to a full inspection by the supplier/manufacturer. KWT/ACE maintain the right to refuse claims for warranty where the inspection proves the damage to be the fault of another party.

Safety Aspects:

The installing contractor is considered to be acquainted with the safety procedures as mentioned in chapter 2.

Face Mounting, Channel Wall Mounting

4.2 Preparation prior mounting

Check the mounting supplies

- 1) EPDM compound (15mm thick)
- 2) EPDM glue (Small bottle)
- 3) A white pencil
- 4) A drill can
- 5) Tube of copper grease
- 6) Chemical anchor capsules and accessories

Check the concrete wall

- 1) Check the concrete wall before installing the KOAS, to ensure the wall is smooth. For this application, it is necessary to remove concrete from the bottom corners of the culvert, to ensure that the corners are square.
- 2) Correct any deviation. Any possible gravel pockets must be filled out and concrete remains must be removed.

4.3 Mounting with chemical anchor bolts

When all points in 4.2 are addressed then continue with following installation procedure:

- 1) Operate the weir penstock to the fully closed position.
- 2) With suitable lifting slings and the lifting points provided, lift the KOAS up and adjust to ensure that the KOAS is vertical and level. Lower the KOAS into position, central to the opening, and ensure the weir plate is level.
- 3) Mark all mounting holes.
- 4) Remove the KOAS and proceed to attach the EPDM seal as follows.

Applying the EPDM compound

The EPDM compound is attached on the back of the frame to provide a seal between the concrete wall and penstock frame.

- 1) Before applying the EPDM compound to the KOAS, ensure the frame is clean and smooth.
- 2) Starting with the bottom edge, cut a suitable length of seal, and mark the holes onto the seal with the white pencil. Apply the seal, then continue to repeat the process with the sides.
- 3) Glue the corners of the seal precisely together by using the provided EPDM glue. When not glued properly it can lead to leakage between the back-plate of the KOAS and the concrete wall.
- 4) Grease the drill can on the outside with the copper grease to prevent ripping of the compound, then attach to a suitable drill.
- 5) Now drill the previously marked holes in the compound, ensuring the hole is central to the hole in the frame.

SAFETY WARNING- Make sure that contact with the EPDM glue to your skin and eyes is prevented. If this does occur, contact your doctor immediately.

Mounting the penstock

- 1) Re-position the KOAS to previous position, adjust as necessary.
- 2) With mounting accessories supplied and suitable electric drill, following chemical anchor instructions insert mounting bolts. (see appendix B) NOTE: For penstocks with a boltable flush invert, this needs to be installed first, please follow instructions for Special countersunk bolts(see appendix B)
- 3) Proceed to fit operation attachments (see section 4.5)

The curing time should be considered precisely

Channel Mounting, in a rebate

4.4 Mounting with jacking bolts

When all points in 4.2 are addressed and the EPDM compound is applied then continue with following installation procedure:

Check before mounting the KOAS the groove for the right dimensions and concrete quality

- 1) Operate the penstock to the fully open position to give access to assist installation.
- 2) Close jacking bolts to their shortest length.
- 3) With suitable lifting slings and the lifting points provided, lift the KOAS up and adjust to level.
- 4) Lower the KOAS into the rebate, packing as necessary to ensure that it remains vertical, level with the invert and central to the channel.
- 5) Remove penstock from the rebate, place the EPDM Sponge seal as above.
- 6) Lower the penstock into rebate and reposition.
- 7) Open the jacking bolts to brace the penstock frame against the concrete rebate and compress the EPDM seal evenly.
- 6) When all set bolts are tightened the KOAS can be grouted in to place.

4.5 Operation Accessories

On some KOAS weir penstocks adjustable side brackets are fitted to provide additional support to the frame.

- 1) Loosen the bolts which attach the side brackets to the penstock frame.
- 2) Lower the brackets level with the coping of the concrete
- 3) Follow the procedure for installation of chemical anchors (Appendix B)
- 4) Re-tighten the bolts attaching the brackets to the penstock frame

Pedestals

- 1) Remove the side plates from the pedestal and attach the pedestal to the penstock using the supplied bolts.
- 2) Place extension shaft into the operation point and align with the top hole of the pedestal. Tighten all grub screws.
- 3) Place gearbox/ Handwheel / protection hood/ actuator into place on pedestal and attach using suitable screws.
- 4) Replace pedestal side plates.

Rising Spindle Attachments

Manual:

- 1) Attach gearbox using supplied bolts.
- 2) Push Handwheel onto gearbox shaft and secure in place using supplied bolt.
- 3) Screw spindle protection tube into gearbox until secure.

Electrical:

- 1) Attach actuator using supplied bolts.
- 2) Screw spindle protection tube into actuator until secure.

Commissioning

Manual Penstocks:

- 1) Operate the penstock to it's fully closed position to check operation.
- 2) Operate the penstock to it's open position, in the case of a rising spindle, locate locking ring under the penstock cross beam and lock into place using supplied grub screw.
- 3) Expose the penstock to water and operate through it's full cycle.

Electrical Penstocks:

- 1) Operate the penstock to it's fully closed position, set the closed actuator limit.
- 2) Operate the penstock to it's fully open position, set the open actuator limit. Locate the locking ring under the penstock cross beam and lock into place using supplied grub screw.
- 3) Set the actuator torque limits for open and close, according to the order acknowledgement.

When setting the operation torques, we would recommend that the actuator is set to open on limit to prevent over-travel, and close on torque, therefore compressing the seal when closed.

Greasing:

In most cases greasing is not required, however when using a phosphor bronze spindle bush or nut, the KOAS must be operated through it's full cycle and a suitable water-resistant grease is to be applied to the spindle bush/nut at stages through the cycle.

4.6 Inspection prior to operation

- 1) Clean the KOAS thoroughly after installation.
- 2) Check the proper functioning of the KOAS by operating the penstock through it's full travel.

☞ **If in any doubt always contact the supplier.**

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5. Operation

5.1 General

The operation of the KOAS is discussed in paragraph 5.2. In paragraph 5.3 possible failures, the causes and methods for solving.

Safety issues

The installing contractor is considered to be acquainted with the safety procedures as mentioned in chapter 2.

5.2.1. Specifications

The KWT pull up weir penstock, type KOAS is provided as a standard with:

- AISI 316L non-rising spindle
- POM Spindle Block
- The KOAS is clock-wise closing.

5.2.2. Opening and closing:

Using a T Crank

- 1) Insert the T Crank into the operation point of the KOAS Weir Penstock
- 2) Turn the T-crank counter clockwise for opening, clockwise for closing.
- 3) If a high operation torque is noticed, the KOAS must not be operated until a cause has been found and rectified.

Using a Handwheel

- 1) Turn the Handwheel counter clockwise to open, clockwise to close.
- 2) If a high operation torque is noticed, the KOAS must not be operated until a cause has been found and rectified.

Using an Actuator

Before operating the actuator, it must be fully commissioned to ensure that it will not overload the KOAS or work past it's limits. For instructions on setting/operating the actuator, please refer to the manufacturer's instructions, following this procedure:

- 1) Operate the weir penstock to it's fully open position, then reverse slightly before setting the open limit on the actuator.
- 2) Operate the weir penstock to it's fully closed position, then reverse slightly before setting the closed limit on the actuator.
- 3) With reference to the data supplied with the KOAS, set the torque limits for open and close on the actuator.
- 4) Operate the KOAS through a full open and close cycle, in dry conditions, then with the design head of water, to check the torque levels are suitable and the gate operates correctly.

Electrical Mode:

For details on the operation in this mode, please refer to the manufacturer's instructions. This must only be carried out by competent personnel.

Manual Operation:

For full details on this mode, please refer to manufacturer's instructions.

Basic Details:

- 1) To engage the Handwheel, operate the Handwheel clutch lever then turn the Handwheel until it is engaged.
- 2) Turn the Handwheel counter-clockwise to open, or clockwise to close.
- 3) Once electricity is restored, or the actuator is operated electrically, the Handwheel clutch will automatically disengage.

For the number of cycles to operate the KOAS please consult the order acknowledgement. The operation torque should be less than or equal to the value stated in the acknowledgement.

- ⚠ Never increase the operating torque by using transmission, spindle driver, enlarged lever i.e. as the maximum allowable torque will be exceeded and may lead to damage of the components.
- ⚠ Great care must be taken to ensure that the KOAS is not operated past it's limits, or operated when obstructed by debris etc.

5.3 Failure

Failure	Possible cause	Suggestion
The KOAS is leaking between frame and wall	Wall not flat	Wall need to flattened according NEN 6722 march 1998, article 8.6
	Sealing not glued correctly	Sealing has to be renewed and installed according the installation instructions.
The KOAS is leaking between slide and frame	Seal damaged	Replace seal
	Application specifications are exceeded.	Please contact supplier.
	Dirt between seal and seal face area	Remove present obstacles
	Seal does not contact seal area. ⚠ Check if the frame has not been deformed due to a non-flat wall.	Adjust screws on front to obtain a better sealing.
Operation torque is significant higher.	Wall not flat	Wall need to flattened according NEN 6722 march 1998, article 8.6
	Spindle polluted or damaged	Clean or replace spindle Please contact supplier.
	Application specifications are exceeded.	Please contact supplier.
	Dirt between seal and seal face area	Remove present obstacles

6. Cleaning & maintenance:

6.1 General

The KOAS is constructed in a way that minimal maintenance is required. Paragraph 6.2 describes the regulations involving regular maintenance.

6.2 Maintenance & Inspection

Minimum Requirements

For correct functioning of the KOAS, it is recommended to operate the KOAS fully through its cycle annually, and inspected for damage or obstruction monthly. The weir must also be visually inspected before each use.

Inspection:

- 1) Spindle must be straight and Dirt Free
- 2) Spindle Block must be clear of debris
- 3) Check Door and Frame seals for damage
- 4) Obstructions must be removed

Other Maintenance:

KOAS Weir Penstocks designed for modulating or heavy duty are fitted with a Phosphor Bronze Spindle Block. This is fitted with a grease nipple, which should be greased monthly with a suitable water-resistant grease. In the case of a rising spindle, the area around the bronze spindle bush should also be greased monthly as above.

NOTE: Do not grease any part of the KOAS Weir penstock unless otherwise stated.

In an aggressive environment or in an application where extreme fouling can be expected, it is strongly recommended to increase the inspection interval.

7.0 Disposal

7.1 General

Paragraph 7.2 describes the procedure that a KOAS at the end of its life cycle can be removed safely and in an environmentally responsible way.

7.2 Removal

Dismantle the KOAS as follows:

- 1) Ensure that the KOAS is sufficiently supported before removing fixings
- 2) Remove all the mounting material from the KOAS.

Ensure that suitable precautions are in place to prevent injury whilst the KOAS is not held in place by the mounting attachments.

- 3) Remove the KOAS from the wall.
- 4) Remove the fixing materials from the wall.
- 5) Dismantle the KOAS and separate materials into suitable classifications.

Dispose of the different materials via recognised methods, and in an environmentally responsible way

Appendix A Drawings

Appendix B Instructions Chemical anchor bolts

Procedure for installing Chemical Anchor Attachments

Please note that chemical anchor attachments in two forms are used for installing various elements of the KKS tilting weir. The following procedure must be referred to for details of this:

Standard Chemical Anchors

Comprising of:

- Stainless Steel Threaded Studding
- Chemical Anchor Capsules
- Drill Adaptor
- Stainless Steel Nuts, Washers and Spring Washers

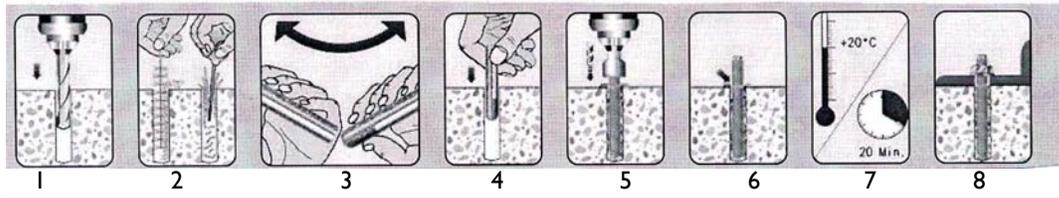
1. Drill Mounting hole in required position to the correct depth and diameter (please refer to details supplied with chemical anchors)
2. Blow out drilled hole using compressed air. (Warning, suitable eye protection to be worn)
3. Insert a chemical anchor capsule into each hole.
4. Attach a length of studding to the drill adaptor, then attach the adaptor to a rotary drill (NOTE: Do not use a hammer-action drill, as this will cause resin to escape from the hole)
5. Place the end of the threaded stud into the hole, then in one motion operate the drill at high speed, while pushing the stud through the anchor to the back of the hole. Once the back of the hole is reached, stop the drill to prevent resin escape.
6. Carefully remove the drill adaptor from the drill chuck, taking care not to move the stud.
7. Once the resin has sufficiently cured, remove the drill adaptor from the stud, however if the stud turns, leave the resin to cure further.
8. Replace the item to be mounted, then place a washer, a spring washer and a nut onto the stud and tighten by hand.
9. Once all required anchors have been installed and are fully cured, proceed to tighten the nuts evenly to the recommended torque. Where EPDM seal is used, this must be compressed evenly to ensure a good seal, however the frame must not be allowed to deform. For torque moment data, please refer to the anchor manufacturer's guidelines supplied with the anchors.

Special Countersunk Socket Anchors

Comprising of:

- Threaded sockets with internal thread
- Countersunk Bolts
- Chemical Anchors
- Special Drill Adaptor

1. Drill Mounting hole in required position to the correct depth and diameter for the threaded socket (please refer to details supplied with chemical anchors)
2. Blow out drilled hole using compressed air. (Warning, suitable eye protection to be worn)
3. Insert a chemical anchor capsule into each hole.
4. Attach the special drill adaptor to a threaded socket, then attach the adaptor to a rotary drill (NOTE: Do not use a hammer-action drill, as this will cause resin to escape from the hole)
5. Place the end of the threaded socket into the hole, then in one motion operate the drill at high speed, while pushing the socket through the anchor to the back of the hole. Once the back of the hole is reached, stop the drill to prevent resin escape.
6. Carefully remove the drill adaptor from the drill chuck, taking care not to move the socket.
7. Once the resin has sufficiently cured, remove the drill adaptor from the socket, however if the socket turns, leave the resin to cure further.
8. Replace the item to be mounted, then insert a countersunk bolt into the threaded socket.
9. Once all required anchors have been installed and are fully cured, proceed to tighten the bolts evenly to the recommended torque. Where EPDM seal is used, this must be compressed evenly to ensure a good seal, however the frame must not be allowed to deform. For torque moment data, please refer to the anchor manufacturer's guidelines supplied with the anchors.



Type	L mm	σ	σ mm	t mm	max. Nm
M10	85	M10	12	90	20
M12	95	M12	14	110	40
M16	95	M16	18	125	80

Please note that these are guide values, therefore reference should be made to the anchor manufacturer's instructions supplied with the products.

Table 1 requisite dimensions and turn moments

Temperature in °C	Mins.	Hours
above 20	10	-
10-20	20	-
0-10	-	1
-5- 0	-	5

Table 2 Stated Curing Times

Appendix C High Density Polyethylene Properties

High Density Polyethylene (HDPE)

SIMONA
plastics

CEE- Safety Data Sheet according to 91/155 EWG	
Trade name: SIMONA PE-HWU-B / SIMONA PE-HWU / SIMONA PE-HD-pipe	
1. Indications to the manufacturer	SIMONAAG Tel: 06752 / 14-0 Teichweg 6 Fax: 06752 / 14-211 D-55606 Km
2. Composition / Indications to components	
Chemical characteristics	Polymer of ethylene
CAS-number	Not necessary
3. Possible dangers	Un-Known
4. First aid measures	
General comment	Medical aid is not necessary
5. Fire-fighting measures	
Suitable fire-fighting appliance	Water fog, foam, fire fighting powder, carbon dioxide
6. Measures in case of unintended release	Not applicable
7. Handling and storage	
Handling	No special regulations must be observed
Storage	Unlimited good storage property
8. Limitation of exposition	
Personal protective equipment	Not necessary

Continue Appendix C

9. Physical and chemical characteristics.

Phenotype:	Form:	Semi- finished product
	Colour:	Black
	Smell:	Not distinguishable
Change of state		
Crystallite melting point		126-130 °C
Fire point		Not applicable
Inflammation temperature		Approx. 350 °C
Density		0.95 g/cm ³
10. Stability and reactivity		
Thermal decomposition		Above approx. 300 °C
Dangerous decomposition products		None
Besides carbon black also carbon dioxide and water as well as low molecular parts of PE will develop during the burning process. In case of incomplete burning also carbon monoxide may arise		
11. Toxic indications		
During several years of usage no effects being harmful for the health were observed		
12. Ecological indications		
No biodegradation, no solubility in water, no effects being harmful to the Environment must be expected.		
13. Waste-disposal indications		
Can be recycled or can be disposed of together with household rubbish (acc. To Local Regulations)		
Waste key for the unused product		57128
Waste name		Waste of polyolefin
14. Transport indications		
No dangerous product in respect to / according to transport regulations.		
15. Instructions.		
Marking according to GefStoff V/EG		No obligation for marking
Water danger class		Class 0 (self classification)
16. Further indications		
The indications are based on your to-days knowledge. They are meant to describe our Products in respect to safety requirements. They do not represent any guarantee of The described product in the sense of the legal guarantee regulations.		

Appendix D Characteristic values of Material

Simona

Technical information for HDPE

	Test method DIN	Dimension	SIMONA PE-HWU
Density, method C	53479	G/cm ³	0.950
Yield stress, Test piece 3	53455	N/ mm ²	22
Elongation at yield stress	53455	%	9
Elongation at tear	53455	%	300
Tensile-E-Module	53457	N/ mm ²	800
Impact strength (std. Small bar)	53453	KJ / mm ²	Without break
Impact strength when notched (U-notch)	53453	KJ / mm ²	12
Indentation hardness H I32 / 30	53456	N/ mm ²	40
Shore hardness D	53505	N/ mm ²	63
Crystalline melting range calorimetric	52328	K	399 – 403
Mean coefficient of thermal expansion	53752	k	1.8 .10
Heat conductivity	52612	W /mk	0.38
Behaviour in fire	4102		82
Dielectric strength. Methode K 20 / 5D	53481	KV / mm	47
Volume resistance Annular electrode	53482	Ohm .com	>10
Surface resistance. Electrode A	53482	Ohm	10

Creep resistance Method KC	53480	V	600
Dielectric constant; At 300-1000 Hz. At 3 .10 Hz.	53483		2.3 2.3
Dielectric loss factor. At 300 Hz. At 1000 Hz. At 3.10 Hz.	53483		< 3.10 5.10 < 3.10
Physiological safety	BGA		JA

The data specified here are guide values and may vary depending on the processing method and the production of test pieces. Unless specified otherwise, these are average values taken from measurements on extruded sheets 4 mm thick. This information cannot be automatically transferred to finished components. The manufacturer or user must check the suitability of our materials for a specific application.