



ACE AQUATEC PIPELINE STUNNER USER GUIDE

AAPS – Version 1.0

PLEASE TAKE TIME TO READ THIS USER GUIDE BEFORE OPERATING YOUR STUNNER

The Ace Aquatec Pipeline Stunner is a continuous flow system designed to slaughter trout at the speed that suits your needs. It achieves three main objectives of maintenance of fish welfare during harvest, operator safety and good end-product quality.

The Ace Aquatec Pipeline Stunner is a two-part device: first stunning the fish instantly and then keeping them insensible until they die. The fish are not handled in any way and the resulting product has a superior appearance with no significant carcass damage. The Ace Aquatec Pipeline Stunner has been specifically designed for working commercial trout farms. Fish are pumped through the large, eight-inch equivalent, square section tube and arrive at the de-watering station completely insensible and ready for packing.

The Ace Aquatec Pipeline Stunner is simple, flexible, safe and robust.

Safe The machine has been designed to kill trout but an equal effort has been expended to make it safe for human operators. The pipeline is large and smooth to prevent damage to your fish. The system constantly monitors itself and will shut itself down to prevent any carcass damage resulting from incorrect stunning.

Simple Once switched on the system is operated by a single button. System status is shown by a traffic light beacon located on the pipeline which can be seen from both ends. Installation is straightforward with most work being undertaken by site staff and a competent electrician. Fault-finding is aided by the system itself and because the machine is composed of only a few modules which are repeated, any repair/replacement can be carried out by staff with minimal training at minimal cost.

Flexible The system has the capacity to run at flow-rates of between 7 to 30 litres of water per second. Only three variants of the system are needed to cover the whole of UK water types with each one automatically adjusting itself to changes in the hardness of the farm water. The design allows for the GO/STOP button to be located at either or both ends of the pipeline. The configuration of the system can readily be changed to increase the system flow-rate as production needs alter.

Robust The electronics is housed in a tough electronic cabinet and requires only single phase mains electricity to operate. The machine has no moving parts and cannot interrupt the harvesting process. The pipeline is composed of 10mm HDPE with stainless steel electrodes.

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1. Safety First

ELECTRICITY CAN KILL! TREAT SYSTEM WITH RESPECT!

When more than 5mA flows through your body you are at risk of injury. When more than 18mA flows through your body you are at risk of suffocation. When more than 60mA flows across your heart you are at risk of fibrillation. The voltages used in the Ace Aquatec Pipeline Stunner can easily kill.

ENSURE THAT THE ENTIRE SYSTEM IS DISCONNECTED FROM MAINS POWER BEFORE OPENING ANY ELECTRICAL HOUSING OR ANY PIPELINE ELEMENT. If you are unsure as to what constitutes an electrical housing switch off anyway.

DO NOT TAMPER WITH THE SYSTEM. Qualified technicians should consult the Maintenance Manual before repairing the system or contact Ace Aquatec.

DO NOT REMOVE ANY EARTH STRAPS. The system is Earthed to protect operators from hazardous voltages.



2. How the System Works

The amount of electricity flowing in the stun tube is critical for correct stunning. The system is constantly monitoring the current and voltage and matching the measured values against the curves calculated by Silsoe. The Ace Aquatec Pipeline Stunner assumes that the fish are held in the pipeline for 30 seconds as its default. Since fish are electrically different to the water surrounding them the system is constantly readjusting itself as the relative quantity of fish to water changes.

The conductivity of water is directly related to the amount of electricity that can flow. Although the geology of the area is a major factor in determining the conductivity, temperature can change water conductivity by a factor of two. Additionally the amount of rainfall can alter conductivity. The chalk streams of southern England are naturally conductive which can rise from 400uS/cm in a cold rainy winter to 1,000uS/cm in a hot dry summer. At the other extreme the soft waters of Scotland do not conduct electricity, in winter the conductivity can fall to 30uS/cm and in a long hot summer rise to over 100uS/cm.

As a consequence the system always tests the water prior to each harvest and configures itself appropriately. [There are limits to the adjustments that the machine can make to itself and under extreme conditions it will fail to achieve the 30 second curve. The fall-back position is to slow the harvest rate so that the fish are held in the pipeline for 60 seconds \(see Changing Speeds – Section 8\).](#)

Once the fish have been stunned they are maintained insensible in the Maintenance tubes. The amount of electricity flowing in these tubes is less critical and is regulated by the matching resistors. To cover the waters of UK only three varieties of matching resistors are required: soft water, medium water and hard water.

3. Ordering

Before placing an order for the Ace Aquatec Pipeline Stunner you need to determine two things:

1. Speed of Harvest (1/4 to 1 metre per second which equates to 25 to 100 tonnes of water per hour or 3 to 12 Tonnes of fish per hour)
2. The water conductivity at your farm. [Direct measurements of water conductivity can be taken using a conductivity meter. The measurement must not be compensated for temperature but the temperature of the water must also be noted. Alternatively send a water sample to Ace Aquatec.](#)

Once these have been determined Ace Aquatec will design the system specifically to your requirements.

Flow-Rate litres per second (m/s)	Number of Stun tubes	Number of Maintenance tubes	Total Pipe length (metres)
30 (1)	2	14	33
15 (0.5)	1	7	18
7.5 (0.25)	1	4	12

Table 1 – Pipeline Examples

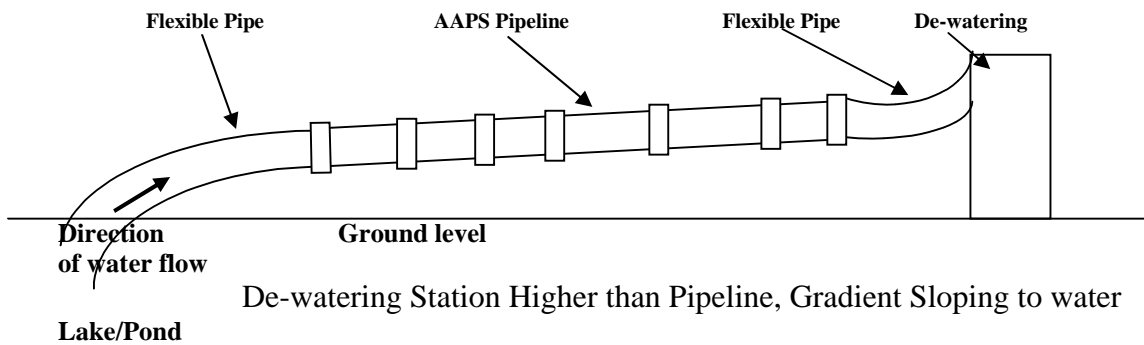
4. User Installation

The AAPS is a permanent installation. The pipe itself has a life expectancy of over 10 years and so careful siting and quality ground-works will not only make installation simpler but will also help to protect your investment.

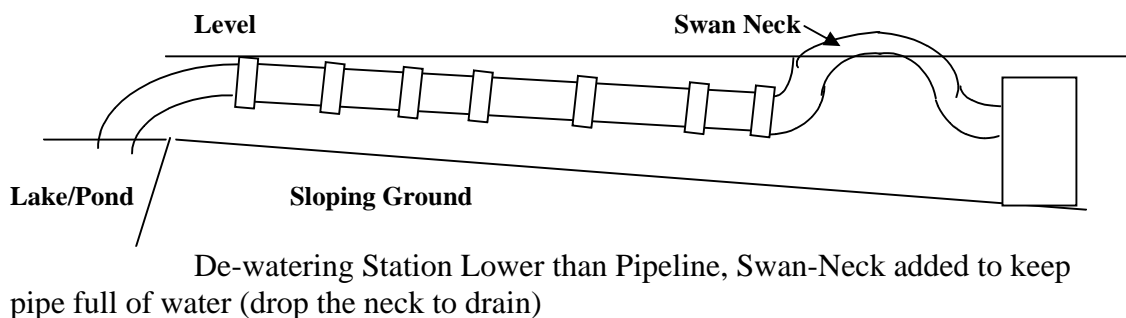
4.1 Siting the pipeline

The siting of the pipeline will affect the ease of system operation. During harvest the pipeline **must be full of water**. To ensure this the de-watering station outlet must be higher than the pipeline. At the end of the harvest the pipeline **should be drained of all water**. The easiest way of ensuring this is to arrange for the pipe to be on a gradient so that the water drains back into the pond/lake. Otherwise the lowest point in the system has to be disconnected to allow the water to drain out. The following diagrams illustrate the recommended set-ups.

Preferred Siting



Alternative Siting





4.2 Supporting the pipe

Ace Aquatec can supply custom-made pipe supports. Alternatively brick piers or scaffolding may be used. Each 2 metre section of pipe needs to be supported at two points 1-1.5m apart to allow the pipe to expand and contract with temperature and to maintain access to the flange ends. **Under no circumstance should the pipeline be supported by the flange ends.**

4.3 Housing the Electronics

The electronics needs to be housed under cover close to one end of the pipeline. In some cases this might be part of an existing building but if not a shed with a floor area of approximately 2m by 1.5m should be used. Within the shed a shelf or table measuring at least 0.6m deep by 1.2m should be fitted. The shed needs to be supplied with single phase mains electricity from a ring or spur fitted with a 30 amp RCD circuit breaker. This should be terminated with four 13A wall sockets. **A hole of at least 35mm is required in the hut/building to pass the conduit.**

When the electronics is to be housed at a distance of more than 3 metres from the pipe or foot or vehicle access is required between the electronics and the pipe then it is the responsibility of the customer to install an openable conduit of at least 25mm diameter sufficient for the task.

4.4 Pipe Layout

The pipeline will be delivered to the site in sections. Gaskets and fixings will also be delivered under separate cover. Ace Aquatec expects the pipeline to be installed by site staff without supervision to the configuration plan which will be enclosed with the shipment.

Figure 1 illustrates the basic configuration.

4.5 Pipe identification

Earth Tubes – Three Earth tube are required. One separates the Stun tube(s) from the Maintenance Tubes and the other two start and finish the pipeline. Earth Tubes can be identified by being one metre long with 10cm electrodes.

Stun Tube(s) – Up to two Stun Tubes (dependent on configuration) are fitted at the head-end of the pipeline. Stun tubes are 1 metre long and have electrodes which are also 1 metre long.

Maintenance Tubes – These are 2 metre long tubes and form the majority of the shipment. One of the Maintenance tubes has a centrally mounted platform for the Traffic Lights. This tube should be placed near the centre of the pipeline.



4.6 Assembling the pipeline

All pipes are handed. One side (the conduit side) has rings welded whilst the other is clear. **Ensure that ALL pipes are assembled with the conduit side on the same side as the electronics hut and that the Traffic Light support is on the top.**

Lay the pipes in their correct sequence on their pipe supports. Remove the protective sheet from the gasket and offer up to the flange-end making sure that the holes align. Bring the two flanges together and bolt through using the 8 supplied M8 fixings. **Do not over-tighten at this stage.**

Once all sections have been assembled check that each pipe section is sitting on its supports. Pack any section that is not sitting on its support with a durable material such as rubber.

Fill the pipeline with water and tighten any leaky joints.

Calibrate the pump speed by noting the time taken for a ball to pass through the pipes prior to the stunning tubes (open the pipeline to observe) and subtract this number from the time taken for the ball to pass through the complete system. When the difference (time in the pipe) is 30 seconds system is calibrated. **The pump speed setting must be recorded for future reference as correct stunning cannot be assured at other speeds.**

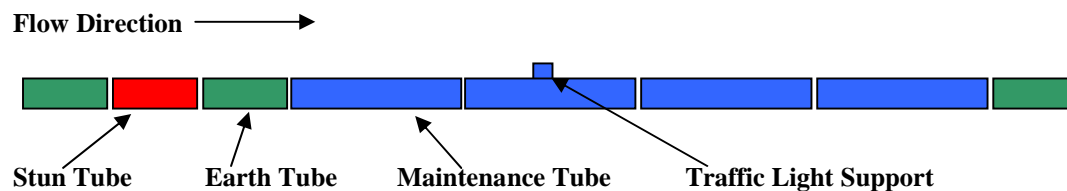


Figure 1 Pipeline Configuration

4.7 System Test

Ace Aquatec will complete the installation once the above works are complete. A member of site staff will be expected to assist the installer on a part-time basis.

The system will undergo a series of tests with the pipeline full of water (but not being pumped).

5. User Controls

The system can be operated from the main control panel (see Figure 2) or from either Control Box (located at both ends of the pipe). The Traffic Lights indicate the status of the system and are located on the pipeline itself. The Traffic Lights are repeated on the main control panel and within each Control Box.



6. Operating the Equipment

WARNING! OPERATING THE SYSTEM WITHOUT THE PIPE FULL OF WATER CAN RESULT IN SERIOUS DAMAGE TO THE EQUIPMENT.

The Ace Aquatec Pipeline Stunner (Figure 2) is simple to operate.

1. Switch on the electronics. The main switch should now be illuminated and the amber Traffic Light should be on (Standby). Check that the Maintenance Tray(s) switch is in the ON position.
2. Fill the pipe with water. **In very hot or very cold conditions run water through the pipe for a few minutes to stabilise the temperature. Do not pass fish through the pipeline at this stage.**
3. Only when the pipe is filled with water. Press the Stop/Go button. The Traffic Light should now be flashing amber (Self Test).
4. Wait until the Traffic Light shows steady Green (Harvest). You may now pump fish through the pipeline.
5. At the end of the harvest switch off the electronics and drain the pipeline of water.

When Fish are in the pipeline the Red Traffic Light should flash occasionally. If the Traffic Lights show a steady or flashing red when no fish are in the pipe there is something wrong with the system which should be investigated as soon as possible (see section 7 - Fault finding).

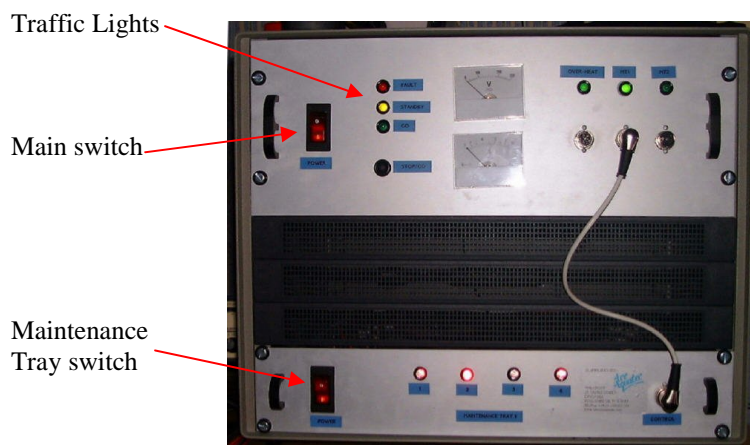


Figure 2



7. Fault Finding

Most faults can be readily identified from the front panel (Figure 3). **These should be noted as soon as they occur so that a qualified technician can make the appropriate repair.**

Flashing Red – When fish are absent from the tube indicates a problem with a Maintenance Tube. With the machine running, note whether the circuit breaker(s) have tripped (not illuminated and in the OFF position). If so one of the transformer circuits has short-circuited.

If the circuit breaker is illuminated note which of the transformer LEDs is NOT shining. This indicates an open-circuit fault.

Steady Red – The system has found a major fault and has shut down. There are three stages at which this can occur:

1. Stage 1 – The Stop/Go button was pressed, the Traffic Lights went from steady amber to steady red almost immediately. This indicates a Maintenance Tray fault. **Check that the Maintenance Tray switch was ON.**
2. Stage 2 – The Stop/Go button was pressed, the Traffic Lights went from steady amber to flashing amber then to steady red without showing green. Stun Tube fault. **This condition might have occurred because the pipeline was not completely filled with water. If this was the case you may press the Stop/Go button again for another try. If a second go resulted in the same result then your water might be out of specification – see Changing Speeds, section 8.**
3. Stage 3 – The steady red condition occurred some time after green was illuminated. This indicates a Stun Tube Fault.
 - Is Over temperature light on? If yes then the stun tube fault needs investigating by a qualified technician.
 - Is Over temperature light off? If yes then wait until it comes on again and restart the system. Note under normal conditions the system should not over heat within one hour. If the problem occurred within a few minutes after the start of Harvesting a qualified technician should be called to investigate.

No Traffic Lights on the front panel. Control board fault.

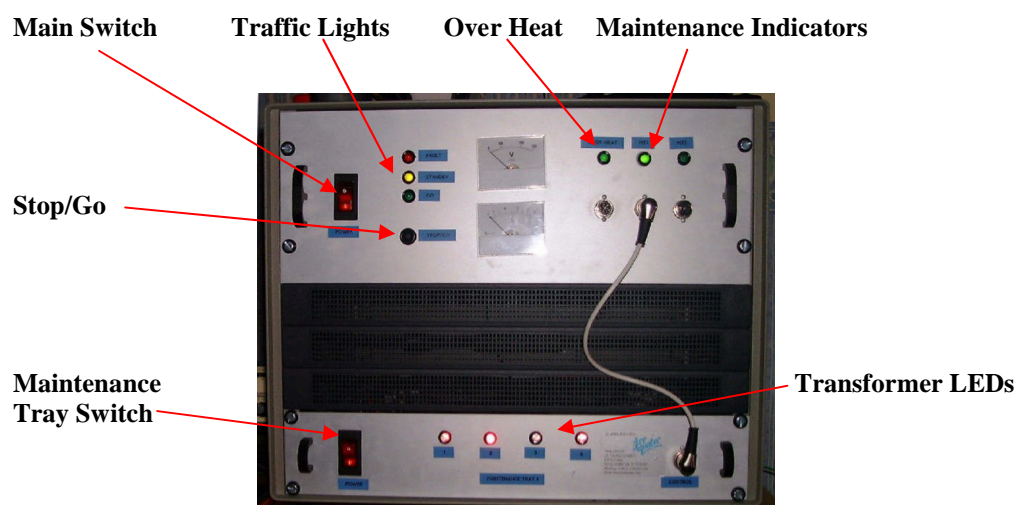


Figure 3 Electronics Front Panel



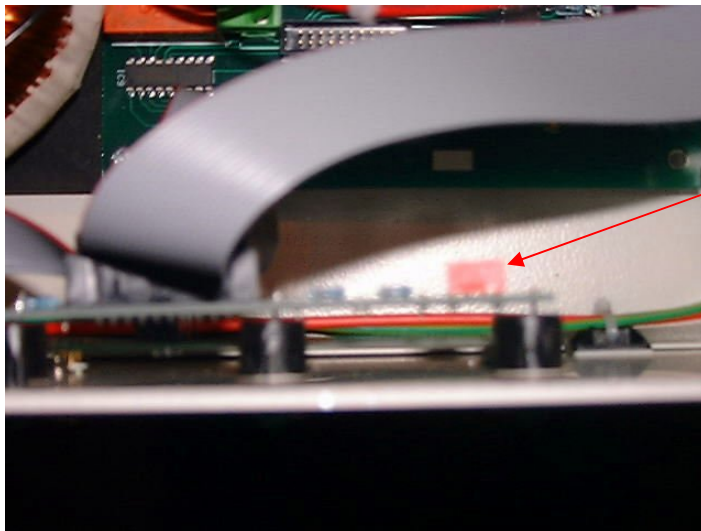
8. Changing Speeds

Under extreme conditions the conductivity of the water might exceed 1,000uS/cm or reduce below 30uS/cm and the system will not be able to stun fish in 30 seconds but can still stun fish in 60 seconds.

The system can be quickly altered to a 60 second treatment time as follows:

1. Disconnect from the mains
2. Remove the 4 screws from the Control Tray
3. Slide the Control Tray a few inches towards you
4. The speed switch is located on the circuit board directly behind the Maintenance Indicators.
5. Slide the switch to OFF
6. Push the Control Tray back and secure with the 4 screws
7. Reconnect to the mains
8. Run the pump at half speed and operate as before.

Although the system can be operated indefinitely on 60 second treatment time, harvest times will be doubled. It is recommended that the system is switched back to 30 seconds once the harvest is over (steps 1 to 7 but switch to ON) as it is probable that water conditions will have altered before the next harvest.



30/60 Switch

9. Maintaining the system

The system has been designed for use over many years and regular maintenance will help extend system life.

After Each Harvest – Switch off electronics, drain the pipeline and ensure the removal of all standing water. **Report all faults to the trained technician.**

Weekly – Switch on the electronics to check the system goes to Standby. **When the electronics is housed in an unheated shed it is a useful precaution to leave it running on Standby for an hour or so each day in damp weather. To ensure that the system**



cannot operate when the pipe is dry, switch the Maintenance Tray circuit breaker to OFF.

Before each Harvest – Test run the system to ensure there are no faults.

Monthly – Visually inspect the pipeline internally to ensure there are no colonising organisms such as algae. **Any growth will distort the electric fields and result in incorrect stunning.** Clean the pipeline if necessary either manually or with a dilute solution of hydrogen peroxide (left in the pipeline for 10 minutes).

Annually – The system should be electrically tested for Earth continuity and all junction boxes should be inspected for corrosion and water ingress. Any suspect component should be replaced.

Every two years – Replace the gaskets and inspect the pipe sections. Any suspect pipe sections should be replaced.

After any pump maintenance or pump change – Re-calibrate system for flow-rate.

9. Further Information and Acknowledgements

The Ace Aquatec Pipeline Stunner has been developed as the logical conclusion to the research work of the Silsoe Research Institute, Bristol University and members of the British Trout Association. The Humane Slaughter Association has recommended the electrical stunning/killing method developed through this research as a humane method for the slaughter of farmed trout.

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