



ACE AQUATEC HS2 USER GUIDE

HS2 – Version 3.0

**PLEASE TAKE TIME TO READ THIS USER GUIDE
BEFORE INSTALLING YOUR HUMANE STUNNER**

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1. Before you start

1.1 Check the Contents

The Ace Aquatec Humane Stunner Mk2 is supplied with the following components:

- Stun Tube
- Maintenance Tube
- Dewaterer tank
- Control Electronics
- Display Electronics
- Interconnecting cables
- User Guide
- Installer's Guide
- Maintenance Guide

1.2 About this Guide

This guide is intended for your use. Please take time to read it. The guide is colour coded with **text in blue being advisory**. **Text in red indicates mandatory instructions or advise which, if not heeded, might result in sub-optimal performance or damage.**

1.3 Contact Information

If you need advise or technical assistance that you cannot get from your supplier, please contact Ace Aquatec.

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2. 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. Depending on the model the voltages used in the Ace Aquatec Humane Stunner Mk2 could kill but is guaranteed to shock.

ENSURE THAT THE ENTIRE SYSTEM IS DISCONNECTED 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.

3. 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 Humane Stunner assumes that the stun tube is full of water and that the fish are held in the pipeline for the required treatment time (30 seconds for salmon).

Setting up the system is critical to correct stunning. The height of the de-waterer should be adjusted to conveniently deliver fish into the harvest bins. The height of the stun tube should be lower than the exit of the de-waterer by some 160mm. The exact height should be adjusted when water is flowing in the system. When correctly setup the Stun tube should be horizontal and the water level just lapping the start of the entry tube.

The conductivity of water is directly related to the amount of electricity that can flow. Although automatic the sequence of operation is as follows. FILL is selected from the OPTIONS menu and the HS2 is filled with fresh water. The water pump is then started and more water is added until the flowing water fills the stun tube. OPERATE is selected. The lights will flash the Green and Yellow beacons and display the message ADD SALT. Small amounts of salt water are added by the machine to the reservoir in the dewaterer and when enough has been added the system will display a steady green light and display the message "SYSTEM OKAY".

No fish should enter the system until the system displays the green light.

Harvesting should be halted if the machine shows a steady red light.

The machine is continually monitoring itself and will advise the operator when action is required. The HS2 will normally undertake these actions automatically. **Users are strongly advised to acquaint themselves with these messages (section 5).**

3.1 Good Stunning

Humane stunning is not only good for the fish but it also improves the flesh quality. It is a low stress method of slaughter which means lower flesh gaping and less scale loss. Consequently it is in everybody's interest that the machine delivers a good quality of stun and operators can recognize a well stunned fish and to stop harvesting immediately if this is not so.

In accordance with EU recommendations the HS2 renders the fish insensible within 1 second of entering the machine. As the HS2 is fully enclosed for operator safety it is not possible to verify this but independent test have shown that when the fish are exposed to a 1 second treatment they immediately lose balance, display clonic spasms, lack gill motion, eye roll and do not respond to stimulus.

All fish exiting the machine must be insensible. Any sign of regular gill movement indicates that the fish is recovering. Other signs include eye roll (when the fish is rotated if the eyes remain steady they are recovering) and attempts to right themselves.

Severe juddering of the muscles on the other hand is a sign of a good stun (clonic spasms).

It is normal that well stunned fish occasionally “gasp” that is when both gills open and close the once.

Operators might also notice Tiger striping where the skin of the fish shows one, two or three vertical dark bands. This is characteristic of electrical stunning and will fade within a few minutes.

Supervisors might like to periodically check that the fish remain insensible when placed in seawater for at least 3.5 minutes. Tests indicate that fish exiting the HS2 remain insensible for 6 minutes.

Death occurs quickly if the fish are gilled. Ace Aquatec advise that gilling takes place as soon as the fish exit the machine.

It maybe noted that electrical stunning stops the heart only temporarily. As soon as the fish is removed from the electricity it will restart and gilling will result in a good bleed-out.

4. Setting up

Document AA-02-046 details the process of installing the HS2. The following text gives readers a brief overview of the procedure.

4.1 Positioning

The HS2 has been designed to have a small, flexible foot-print. The system should be assembled – without water – and positioned to allow ease of use. The de-watering tank is not handed and the flexible pipe can be mounted to the left or right to fit into your space. [It is advised that the harvest supervisor can read the display \(mounted on](#)

the electronics box) without difficulty. Adjust the de-watering tank to a convenient height for the gilling table / harvest bins.



Figure 1 – The Dewatering tank setup for right-handed entry.

4.2 Connecting the hoses

The system requires four types of hose: the large (12”) flexible hose (supplied), a length of 2 inch and 3” flexible hose and a 1” filling hose(supplied). The large hose connects between the stun tube and the de-watering tank. The 3 inch tube connects the reservoir (part of the de-watering tank) to the in-flow of the water pump (not supplied) and the out-flow of the pump to the stun tube. The 2” hose connects to the overflow (on the de-watering tank). The 1” hose connects between the fill solenoid on the dewatering tank and the fill connection on the stun tube. Further 1” fittings are supplied for draining the stun tube and dewatering tank. The customer is responsible for connecting the solenoid to the water supply although Ace Aquatec supply a variety of hose tails to suit most water hoses.

Once the hoses are secured with the clips provided fill the reservoir (select FILL) and run the water pump to check for leaks. Additional hose clips may be required to minimize water loss.

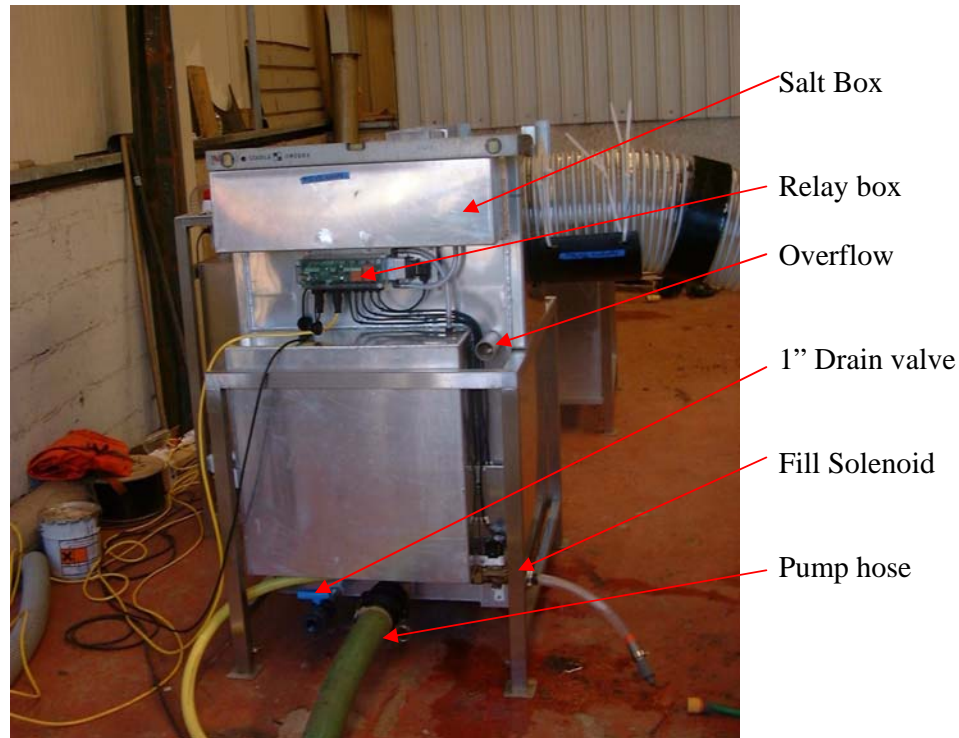


Figure 2 – Dewatering tank

4.3 Adjusting heights

The Stun tube should be horizontal and – with the water flowing at 1,300 litres per minute – raised or lowered in height until it is full of water. This will be approximately 160mm below the exit tube.

4.4 Electrical Connections

There are five electrical cable types:

- 3 way Bulgin 9000 for the mains power.
- A 6 Way Bulgin cable which connects into the Electronic box from the Display box.
- A 7 Way and 3 way Bulgin cable which connects the Control electronics and Relay box.
- 4 way cables which connect the Electronics to the Stun tube.
- 4 to 2 way cable which connects the Stun tube to the Flexible hose.

All connectors are pre-wired and should plug easily into their counter-parts.

Once assembled the system can be started and stopped from the main switch on the side of the electronics box.

The Display should briefly read “HS2 V10.0” and the amber beacon flash.

4.5 System Testing

The system includes in-built tests that can be used to assure the user that all is well or diagnose faults without the need for expensive test equipment.

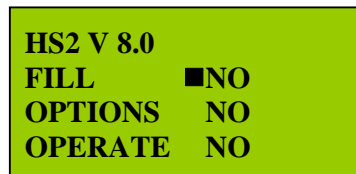
4.5.1 Cable Continuity

The system checks the continuity of the attached stunning cables automatically. This can be checked before operation by removing one of the stun cable connectors. After 10 seconds the display will read CHECK CABLE and flash the red beacon.

Reattaching the cable will, after another 10 seconds result in the display reading STANDBY and the amber beacon will flash.

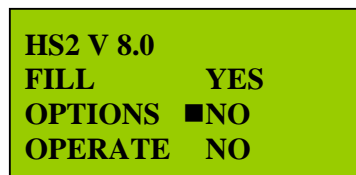
4.5.2 User Tests

When the button under the display is pressed the screen shows the following:



```
HS2 V 8.0
FILL      ■NO
OPTIONS   NO
OPERATE   NO
```

The cursor blinks in front of the instruction that is currently on offer and moves to the next possible instruction after 5 seconds. For example if the user pressed the button with the cursor in front of the FILL instruction then the display will change from NO to YES.



```
HS2 V 8.0
FILL      YES
OPTIONS   ■NO
OPERATE   NO
```

If the user were to not press the button then the cursor moves down the screen, the display returns to normal and the machine will start FILLING itself.

The user can change the instruction at any time by pressing the button at the appropriate instruction which returns it to its opposite state and the machine will – in this example stop FILLING and return to STANDBY.

The more advanced user tests are found when OPTIONS is selected.

The first screen allows the user to switch the flashing beacons on or off.

HS2 V 8.0
LIGHTS ■ YES

If the button is pressed YES will change to NO and the beacons are extinguished.

Whether the user selects this option or not the screen will change to the following:

TEST
SALT ■ NO
LIGHTS NO
AMP NO

As before a selection is made when the cursor is flashing in front of the chosen instruction and the NO changes to YES. The user should be aware that the machine will only do one test at a time so selecting YES to all three will result in one of the tests being carried out but not all three.

SALT test: results in the salt solenoid being opened for 60 seconds. (Can be used to drain the tank after operation).

LIGHTS test: results in the display going through all its 11 possible modes and lighting the appropriate beacons. This is useful for operator familiarisation.

AMP test: this test results in the machine gently exercising the control circuitry, amplifier and feedback loops. If all is working the normal display will show the voltage steadily rising and (if water is in the stun tube) the Current rise too. This test is useful in the event of a system malfunction and an electrician with an true RMS multi-meter can check between pins 1 and 2 on the stun tube cable harness that the voltage on the display is roughly in line with the readings on his meter.

4.5.3 Water Speed

With the water running check the speed by timing how long a small object (such as a rubber ball or a recently dead fish) takes to go through the system. Raise or lower the pump speed until the object takes at least the recommended treatment time to pass through the system.

Note the pump speed and raise the stun tube if the water level in the stun tube back fills into the entry tube or lower the stun tube if it is not completely full of water.

5. General Use

Users will develop a feel for the speed of the water pump and the relative height difference between the de-watering tank and the stun tube.

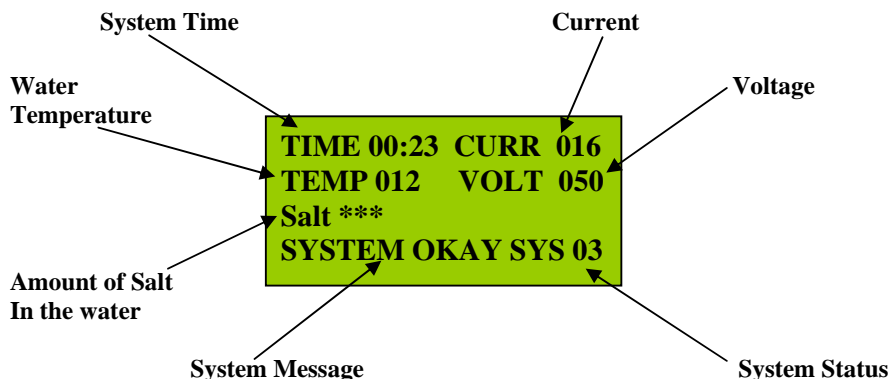
The normal sequence of operation would be as follows:

1. Turn the system on with the switch on the side of the electronics box (Figure 1).
2. Ensure all drain valves are shut, all hoses are connected, the water supply is available to the machine and select FILL. Water should start flowing into the stun tube.
3. The machine will automatically fill itself until the water level in the dewatering tank reaches the upper sensor. Prime the water pump and start.
4. Ensure the salt reservoir has a saline solution and select OPERATE.
5. The machine will test itself and add fresh water and salt as required. It should be noted that salt is only added when the water level is above the lower sensor. The display indicates this by showing WATER LOW and then return to ADD SALT when there is sufficient water for operation.
6. Wait for the system to settle down ensuring that it does not run out of saline solution. It will alternate between ADD SALT and SYSTEM OKAY as it adds salt to the water. This process may take a few minutes.
7. You are now ready to harvest.

Whilst the above 7 steps are recommended the machine will achieve this by the user going immediately to OPERATE. Whilst this is simpler the machine still requires water in the stun tube and the water pump requires a static head for priming. Ace Aquatec therefore recommends that the user follows the above steps and goes for a cup of coffee between steps 2 and 3.

5.1 Understanding the Display

At all times the Display Box tells you what is happening. The 3 beacons give you confidence that the system is operating correctly but familiarity with the display means that you can anticipate potential problems before they can disrupt the harvest.



5.1.1 System Time

The system time (since Power up) is displayed in Hours : Minutes.
The example shows the system started 23 minutes ago.

5.1.2 Current

The amount of current flowing in the system is constantly measured. Whilst not essential for day to day operation this number can help maintainers spot the problem if a fault occurs. The display is in tenths of an ampere. The example shows 1.6A flowing.

5.1.3 Water Temperature

This indicates the approximate temperature of the recirculating water in degrees C (in the example 12 degrees Centigrade). During the harvest the water pump will increase the water temperature. Too high a temperature will encourage bacterial growth and might compromise carcass quality. [Users should be aware of the water temperature and either dump some water using the drain valve \(in which case the machine will refill with cool fresh water\), refrigerate the water using a refrigeration unit or add ice.](#)

5.1.4 Voltage

The system shows the voltage in Volts per metre. Again not essential for normal operation it is useful for diagnosing a problem. The example shows 50V/m.

5.1.5 Salt

The amount of salt in the water is displayed as a number of asterisks (in this case 3). The system becomes operational when one asterisk is present. As more salt-water enters the system the number of asterisks increases.

5.1.6 System Message

The system tells the user its status. In the example it reads “System Okay” meaning everything is good for stunning fish. Other messages can be displayed (see next section).

5.1.7 System Status

This number (from 0 to 11) is the digital equivalent of the System Message.

5.2 Understanding the System Message

There are 11 system messages. Most are advisory in that the user need not act on the information however when the red beacon is flashing by itself this indicates a fault.



Status Number	Light pattern	System Message	Explanation	Action
0	Amber	STANDBY	Enters this mode automatically on power-up	None
1	Amber	FILLING	Water is being added to the machine.	None. The system reverts to STANDBY when full.
2	Amber + Green	ADD SALT	Water is too fresh	Check that the saline reservoir is not empty.
3	Green + Red	ADD FRESH	Water is getting too salty	Check that the water supply is on.
4	Green	SYSTEM OKAY		Harvest
5	Green + Amber	WATER LOW	Not enough water in system	Check that the water supply is on.
6	Red + Amber	WATER HOT	Available but not programmed	Not programmed yet.
7	Red	CHECK CABLE	System detected cable unplugged	STOP HARVESTING. Check connections are good.
8	Red	CHECK AMP	No current is being drawn.	STOP HARVESTING. Call maintainer.
9	Red	TOO HOT	Electronics are overheating.	STOP HARVESTING. Wait for the system to cool.
10	Red	OVERCURRENT	Water too salty or system fault.	STOP HARVESTING. Try refilling with fresh water. If fault persists call maintainer.
11	Red	TEST AMP	Electronics are being tested.	System is live during test. Beware.

6. Equipment Maintenance

Regular maintenance will prolong the life and effectiveness of your system. This is detailed in the Maintainer’s Manual AA-02-047.

6.1 Before each Harvest

Before each harvest ensure that you have an adequate supply of fresh water, saline solution, and fuel for the water pump. Visually check all exposed cables for wear before connection and, if necessary, repair or replace.

6.2 After each Harvest

It is important to maintain the cleanliness of the HS2. The machine should be drained of the recirculation water after each harvest. The Stun and Maintenance tubes should be pressure washed using a flexible lance. The dewatering tank should also be pressure washed using a hand-held lance. The machine should then be disinfected by refilling the system with a water / disinfectant mixture and allowing the water pump to circulate the mixture for the recommended time. The machine should be left in a drained state.

The electronic enclosure and the rear of the dewatering tank should never be cleaned with a pressure hose. If required disinfect by hand.



The HS2 should be visually checked and assessed for any mechanical damage such as cracked welds, leaking pipe-work, cable abrasion and damaged connectors. These should be reported to the maintainer and appropriate action taken. Leaks and hose punctures should be repaired.

6.2 Monthly and Annually

Described in AA-20-047.