

SMOLT Counter



User Manual



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PREFACE – The Smolt Fish Counters

VAKI Aquaculture Systems thank you for choosing the MACRO Range of fry and smolt counters.

These counters are used in many aquaculture enterprises where an accurate knowledge of fish numbers is important. Applications include counting fish when grading, accurate stock control and when transferring fish between tanks and delivering fish by helicopter, well boat and truck.

The MICRO and MACRO counters have been developed in collaboration with a number of leading fish farming companies and used worldwide for counting a wide variety of species including Atlantic and Pacific salmon, trout, char, sea bass, sea bream, cod, tilapia, cobia, yellowtail, flatfish and most other farmed fin fish species.

VAKI continues to develop the features and functions of the counters for use with more specialised species including prawn, shrimp, eel and ornamental fish.

The counters are based on a digital scanning camera and computer vision. The outlines of objects that pass beneath the camera are recorded and custom designed software is used to analyse the images and count the individual fish.

The fish enter the counter and the water from the fish pump or spray bar then carry the fish over the curved counting channel. The fish then pass over a light source and a mirror above the light reflects the images of each fish back to the digital camera where the outlines are recorded and counted.

The MICRO is ideal when counting small fish from 0.2 g and has a 500mm wide counting channel, the MACRO channel is 1000mm wide and ideal for counting both fry and larger fish such as smolts. Both counters can be supplied with multi counting channels, which can be used to count separate batches of fish simultaneously, for example when grading.

The SMOLT counter is available in two sizes, 1400 mm and 2100 mm wide. It is a special version of the Macro counter, designed for counting smolt of size 40-200 gram. The smolt counter is of especially robust construction made to withstand the excessive load on-board Wellboats. The smolt counters are made for high capacity counting. The smolt counter is sometimes installed on a two axis giro mechanism to ensure that the counting field is in horizontal level. The giro is either automatically controlled by an inclination sensor or manually controlled.

This manual is a guide for the SMOLT Counters.

Warranty

VAKI Aquaculture Systems Ltd. offers warranty for and manufacturing defects that appear within one (1) year from the date of delivery from VAKI Iceland, on condition that the equipment has been assembled, used and maintained in accordance with the instructions for assembly and use. Changes to the start date of this warranty, such as delayed delivery to the user, must be reported to VAKI upon receipt of the equipment and agreed in writing.

VAKI undertakes to repair all defects that are due to faults in the design, materials used, or manufacture of the equipment. These defects will be rectified by repairing the equipment, or replacing components. The customer may be required to return the complete unit or parts thereof to the factory in Iceland for repair. VAKI accepts corresponding warranty for original parts fitted by VAKI as replacements, for a period of one (1) year from the date supplied.

VAKI will **not** be liable for:

- * *Incorrect assembly and use, or inadequate maintenance.*
- * *Defects which result from the fitting of materials, components, or devices not supplied by VAKI, and which are purchased and fitted by the user.*
- * *Defects due to changes made to the equipment by the user, without the written consent of VAKI.*
- * *Faulty or inadequate repairs carried out by the user.*
- * *Normal wear and tear of the equipment.*
- * *Faulty connection of electrical equipment.*
- * *Faults caused by excessive voltage.*
- * *Damage or stoppage due to immersion of the computer or camera in water.*
- * *Damage to electrical supply cables.*
- * *Any economic loss that may arise from production stoppage.*

If faults or defects appear in the equipment, the user must report this in writing to VAKI or its appointed representative as soon as possible, and without unjustifiable delay. The report must be sent within two (2) weeks from the expiry of the deadline, which is one (1) year from the date of supply by VAKI Iceland.

If the purchaser does not inform VAKI or its representative within the time limits stated above, the purchaser shall forfeit the rights of the warranty.

Connections

There are three connections. Main power, Camera network connection and a giro control (optional). A connection scheme for the counter is provided upon delivery.



1. Giro control input
2. Connection for main earthed power.
3. Local Area Network (LAN) connection.

Set Up

When setting up the SMOLT counter it is important to note the following:

- When counting in extreme cold weathers keep the counter running to prevent the light from flickering.
- Before each count check that the mirror/glass is completely clean and free from any stains, residue or water droplets.
- Ensure that all pipes and hoses are securely fastened.
- Connect the power cable to earthed power outlet. The use of a UPS (un-interrupted power supply) device is recommended. The counter power requirement is 80-100W.
- Ensure that water and fish have a continuous free flow from the counter. Backpressure in the pipes can overload the counter.

Pumping

When using a fish pump (vacuum pump or pressurised hold) to transfer fish to the counter it is important to ensure an even flow of fish and water. Uneven delivery of fish to the counter can cause inaccurate counting as the number of fish may exceed the capacity limits.

It is also important to test the counter on the correct fish size settings pumping water only to ensure excess water does not create over-counting and adjust pump as required.

Ref: section 7.2 “Test with water only”

Start Up

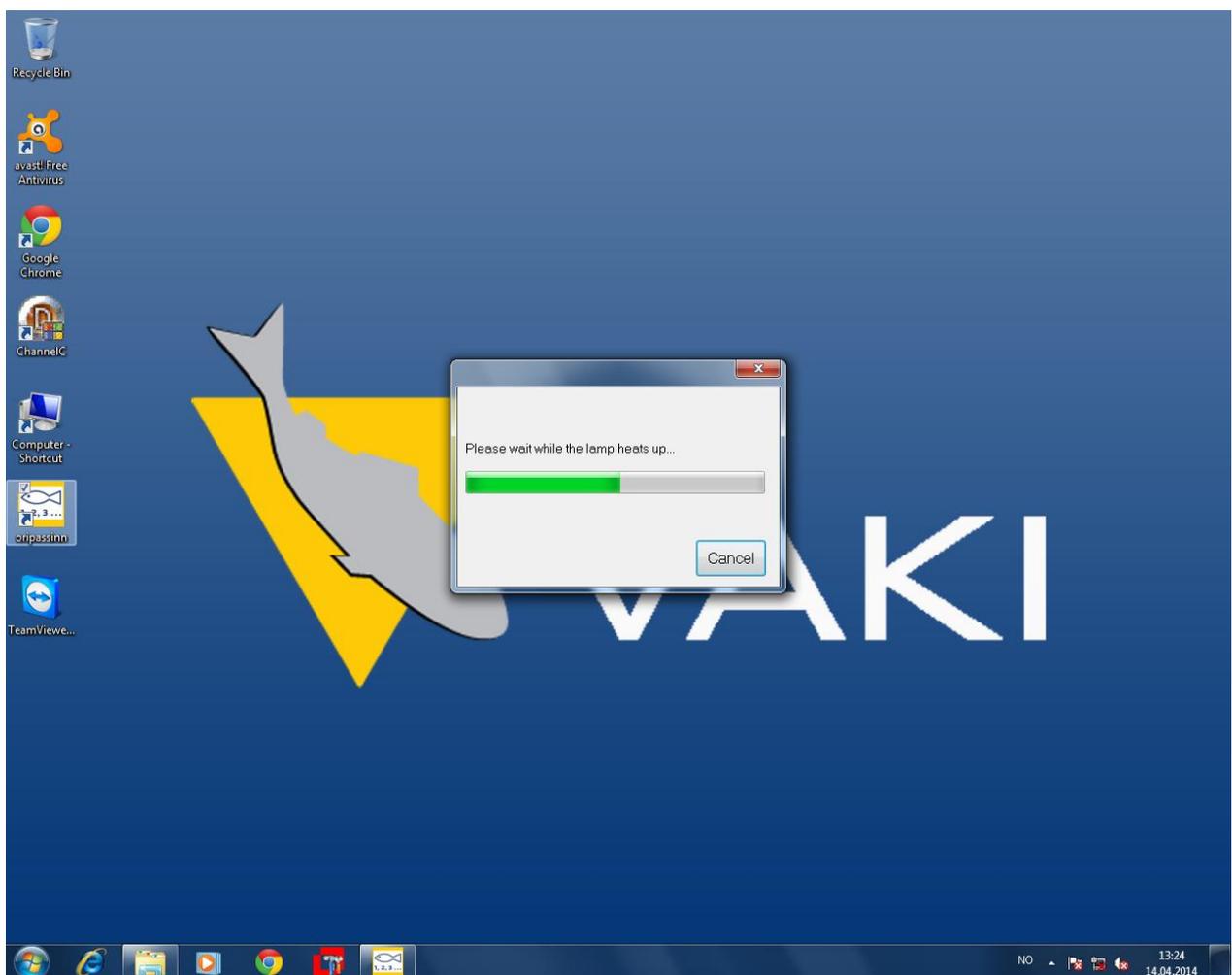
The counter is now assembled and set up as instructed.

Turn on counter.

Make sure to turn on power to the counter unit. Then turn on the computer and start-up the Vaki counter program. An icon can be found on the desktop (either named Vaki counter or “oripassinn”)

The following window will be shown on screen. The colder the environment the longer it will take for the lamp to reach working temperature. Newer counters are equipped with diode lights and this will not apply.

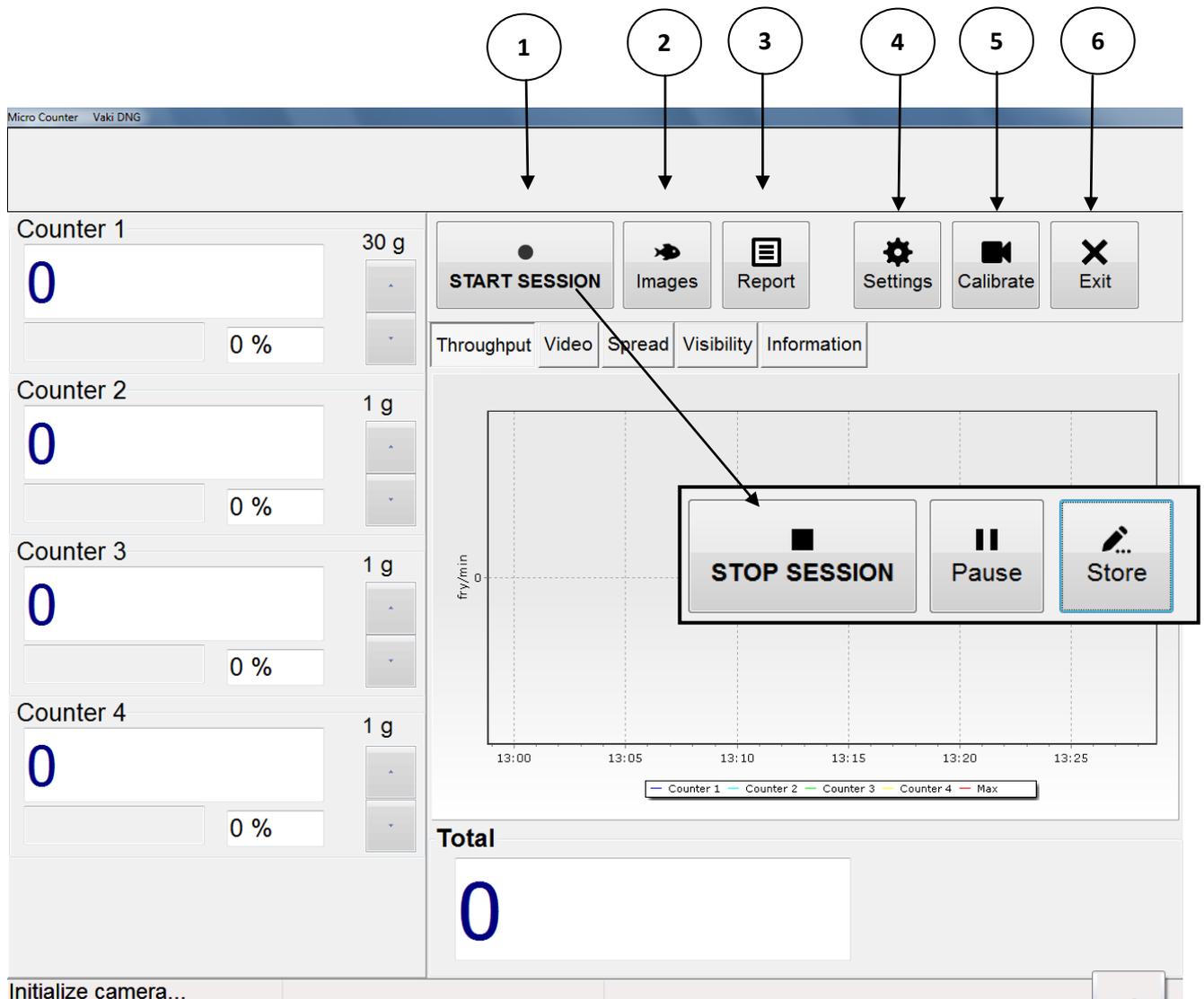
The green bar shown is not an indicator of lamp temperature only a preset timer.



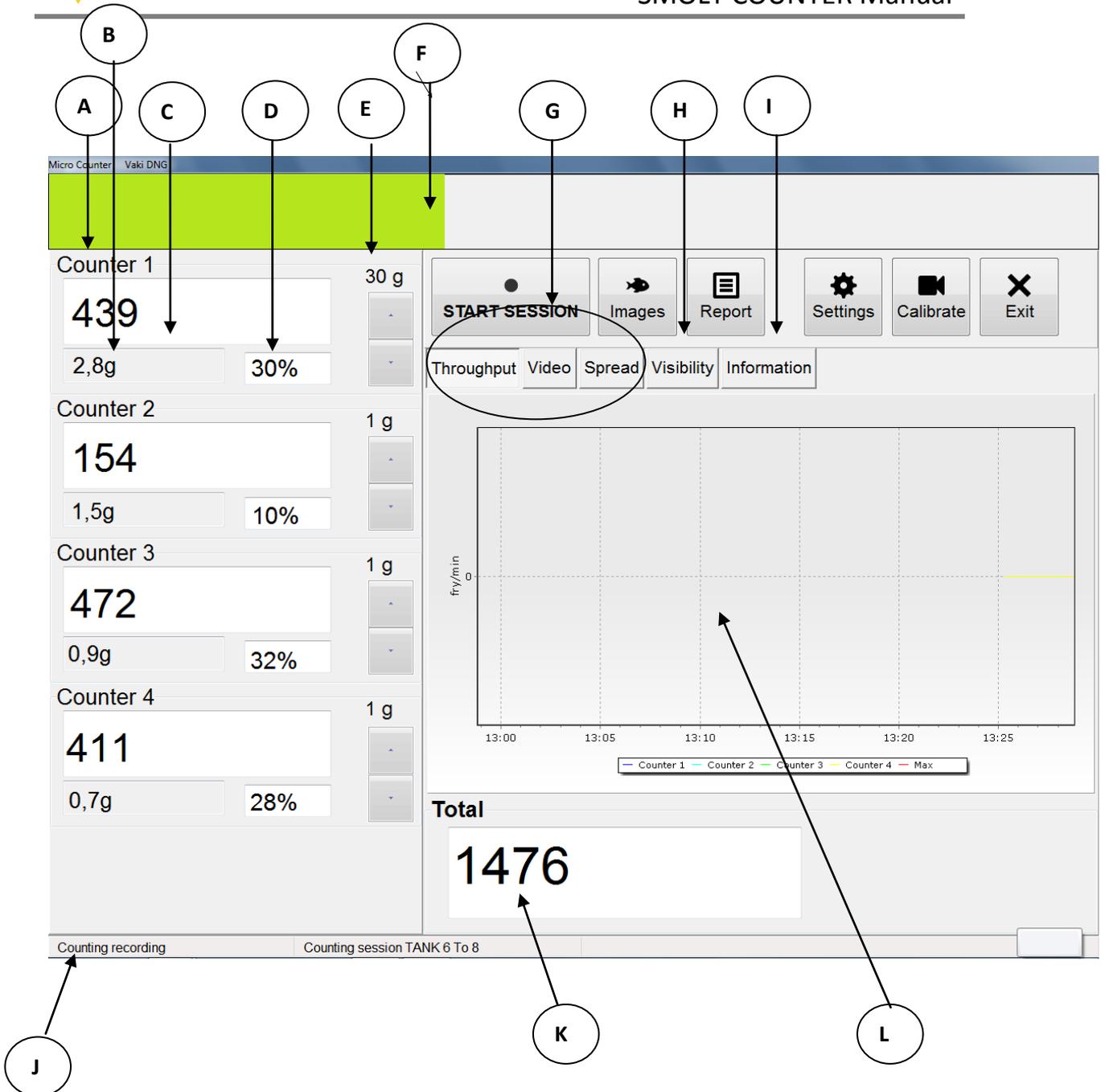
If the counter has been used recently and the lamp is still warm it is possible to skip this by pressing, “**Cancel**”. The main screen will then be shown.

Main Screen

The features and options shown on the main screen are as follows.



1. **“New counting session”** starts a new counting session, once activated this button will change to **“End counting session”**
“Pause” to pause the counting when cleaning mirror. Remember to press again to start counting.
“Store” to store an intermediary batch count to the counting report.
Reminder: if counting in batches remember to store the last batch before ending the counting session
2. **“Image”** to view recorded images.
3. **“Report”** to view counting reports.
4. **“Settings”** access settings menus.
5. **“Calibration”** to automatically calibrate the counter.
6. **“Exit”** to close the software before switching of counter.



- A. **Channel label** The name of the label can be changed in settings by double clicking on channel label.
- B. **Estimated Size** gives the average weight for each counting channel. The moving blue bar is an indication of the sample level, once sample is complete the average weight is displayed
- C. **Shows the count** in each channel,
- D. **Shows the %** of fish in that channel.
- E. **Size group** selected with size group buttons below. Set the size group closest to average fish size to be counted for each channel
- F. **Progress Bar** indicates the rate of fish passing through the counter, turning yellow and **then red when over capacity.**
- G. For selection between **Throughput, Video or Fish spread** on the screen.
- H. **“Visibility”** used to display the graph showing intensity of light detected by camera.
- I. **Information.** Information about the counter head. Type, IP address, Scan rate, Light strength, Serial number, Software version and more.

- J. **“Counting”** / or **“Not counting”** message indicates if counter is ready to count.
If this area turns red and shows as **“Not counting”** and the error message **“visibility insufficient”** appears, please refer to Calibration & Visibility Section of this manual.
- K. **Total count** including all batches stored in the counting session. If tabbed twice it shows Sub Total
- L. **Throughput** graph, the lines show the rate of fish passing through the counter and **the red shows the maximum capacity the counter can accept.**

Set Fish Size

The size groups are: **0.1g, 0.3g, 1g, 3g, 10g, 30g, 100g, 300g etc.**

Using the size group buttons set the size group closest to the average size you intend to count. Each size setting covers a range of fish approximately 5 x smaller and 5 x larger than the size setting.

Should sensitive settings for very small fry count small air bubbles, water disturbance, or suspended particles it is advisable to increase the initial size range.

Preparation for counting:

Each counting session is usually a critical task and should be prepared good time in advance.

If the counter has not been used for a long period the following should be done:

1. Power up the counter and check that the background light is functional
2. Clean the light top surface and
 - a. the two internal mirrors (on the Smolt 1400) or
 - b. the glass surface (on the Smolt 2100)
3. Turn on the computer and check that it connects normally to the counter camera. This can be seen either by looking at the visibility curve or the video signal

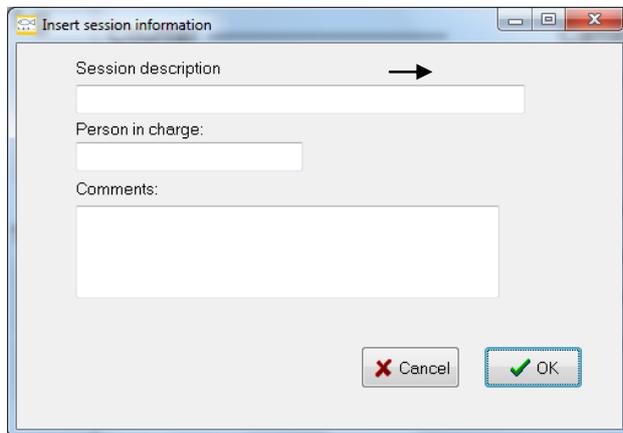
Before every count the counter should be tuned on good time in advance to heat it up, clear any condensation or moist that may sit on internal parts.

1. Check the visibility curve
2. Reset the counter by starting a new counting session.

Start Counting Session

To start counting press “**New counting session**” button on the main screen.

The display will show:

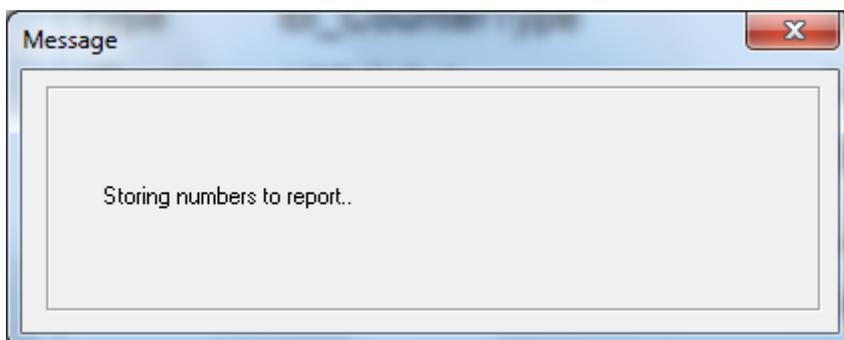


Text such as the site name, tank identification, the population / year class can be entered by pressing the keyboard buttons as indicated. This information will be included in the report. Press “**Enter**” on the keyboard after typing. **IT IS IMPORTANT THAT ONLY LETTERS AND NUMBERS ARE USED WHEN A NAME IS GIVEN. DO NOT USE SIGNS SUCH AS (/ , . & - OR THE DATA FILE WILL NOT BE SAVED.**

The counter should now show 0 in all counting windows. Start pumping or netting the fish into the counter.

Store and Continue Counting

An intermediate count can be stored by pressing the “**Store**” button. Then the following message will be shown.



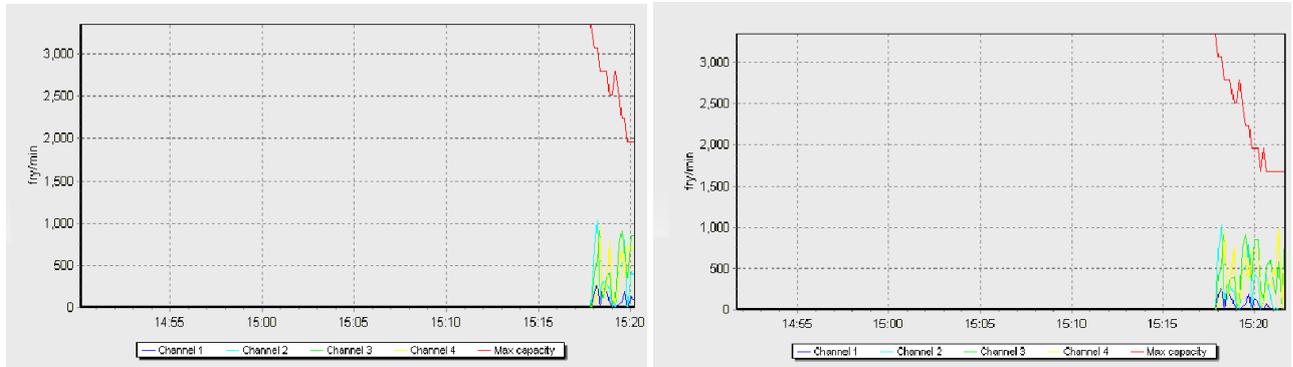
The number will be stored to the report together with the time label.

Troughput Video and Fish spread

The Video tab shows the real time camera image of the scanning area. This screen can be used to view how the fish pass thru the counter and identify any obstructions or objects remaining in the camera’s field of view.

The Fish spread function shows a graphical representation of the position and quantity fish passing thru the counter across the scanning area. An even spread of fish across the scanning area will give maximum capacity and accuracy.

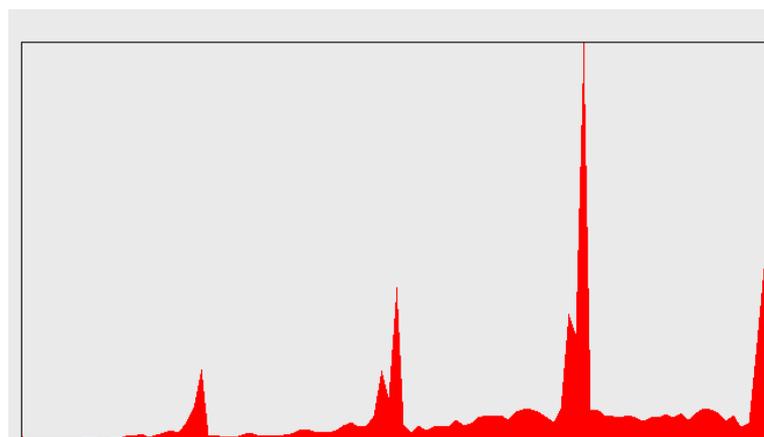
Throughput:



Video:

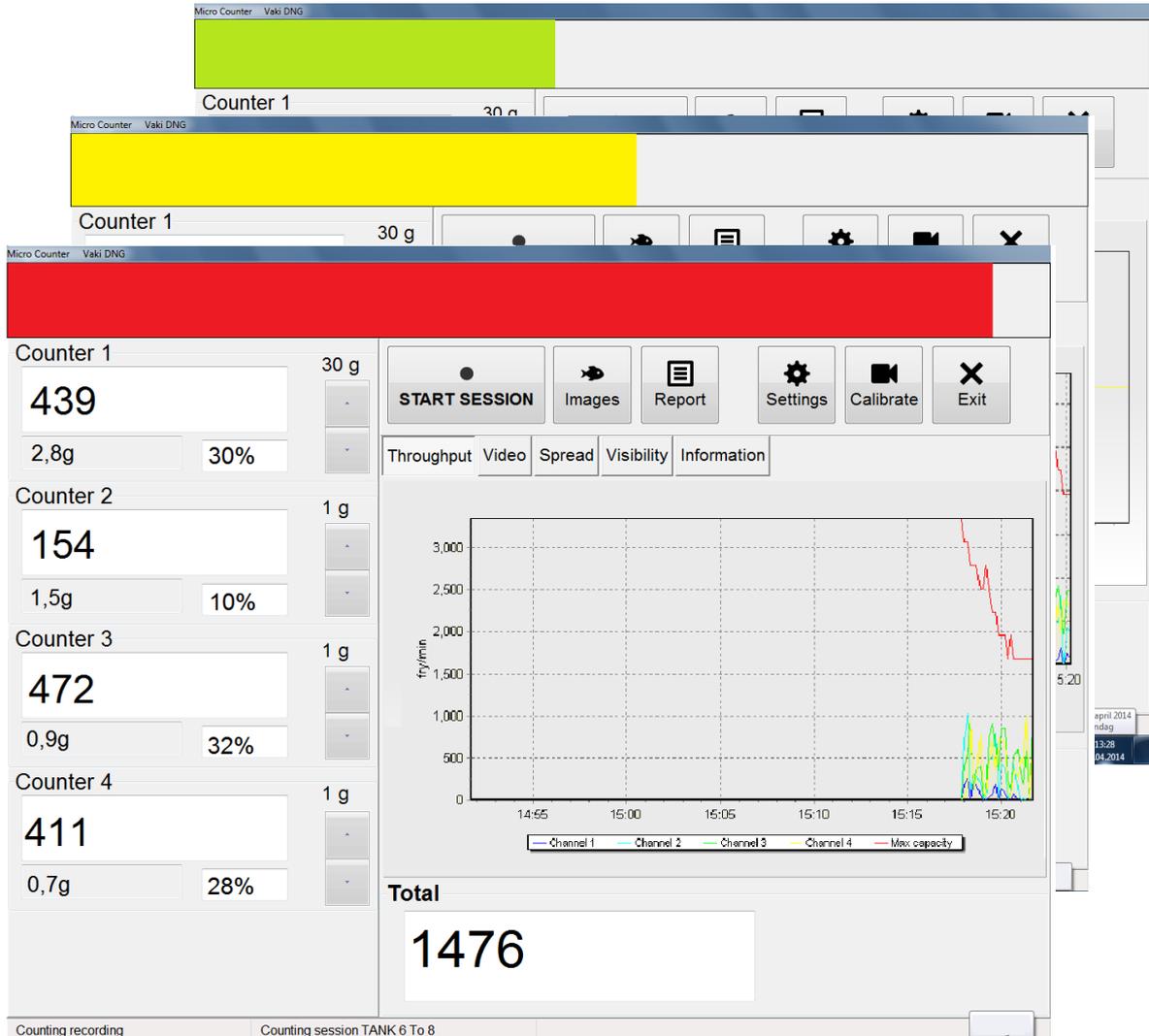


Fish spread:



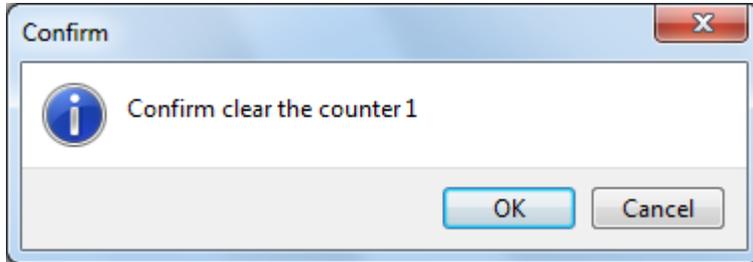
Progress bar

The progress bar gives an indication of the rate of fish going through the counter and relation to counter capacity limit. The progress bar will change from green to amber as the flow rate of fish increases toward maximum counter capacity and finally go red when the flow rate is on or over the maximum limit of the counter.



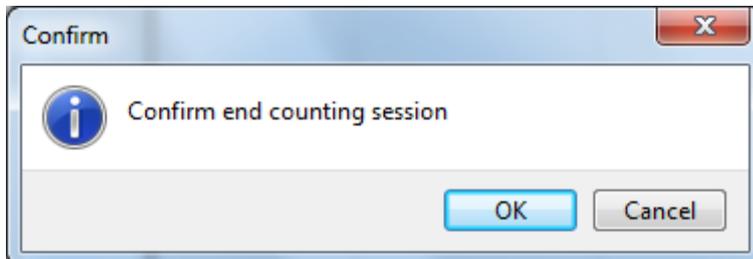
Clear one channel

It is possible to reset the number each counting channel, this will set the channel count back to „0“ but will not affect the total count.



End counting session

When counting is finished, press **“End counting session”**.



The counting report containing information on the counting session including total and individual channel counts, stored numbers, and the image record are stored.

Settings

To access the settings function press “**Settings**” on the main screen.

Settings

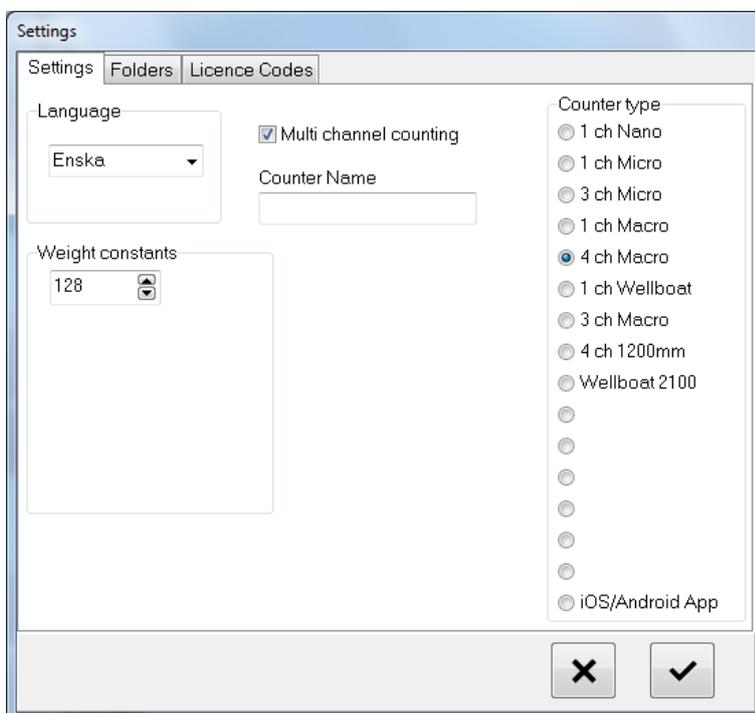
In the screen below it is possible to choose between **languages**. Select the species for the biomass function and the **weight constants** can also be used to fine tune the average weight calculations for each group.

Both Micro and Macro counters are available in multi-channel configurations which can be used for counting from graders. The Multi-channel versions of the counters may also be used in a single channel mode.

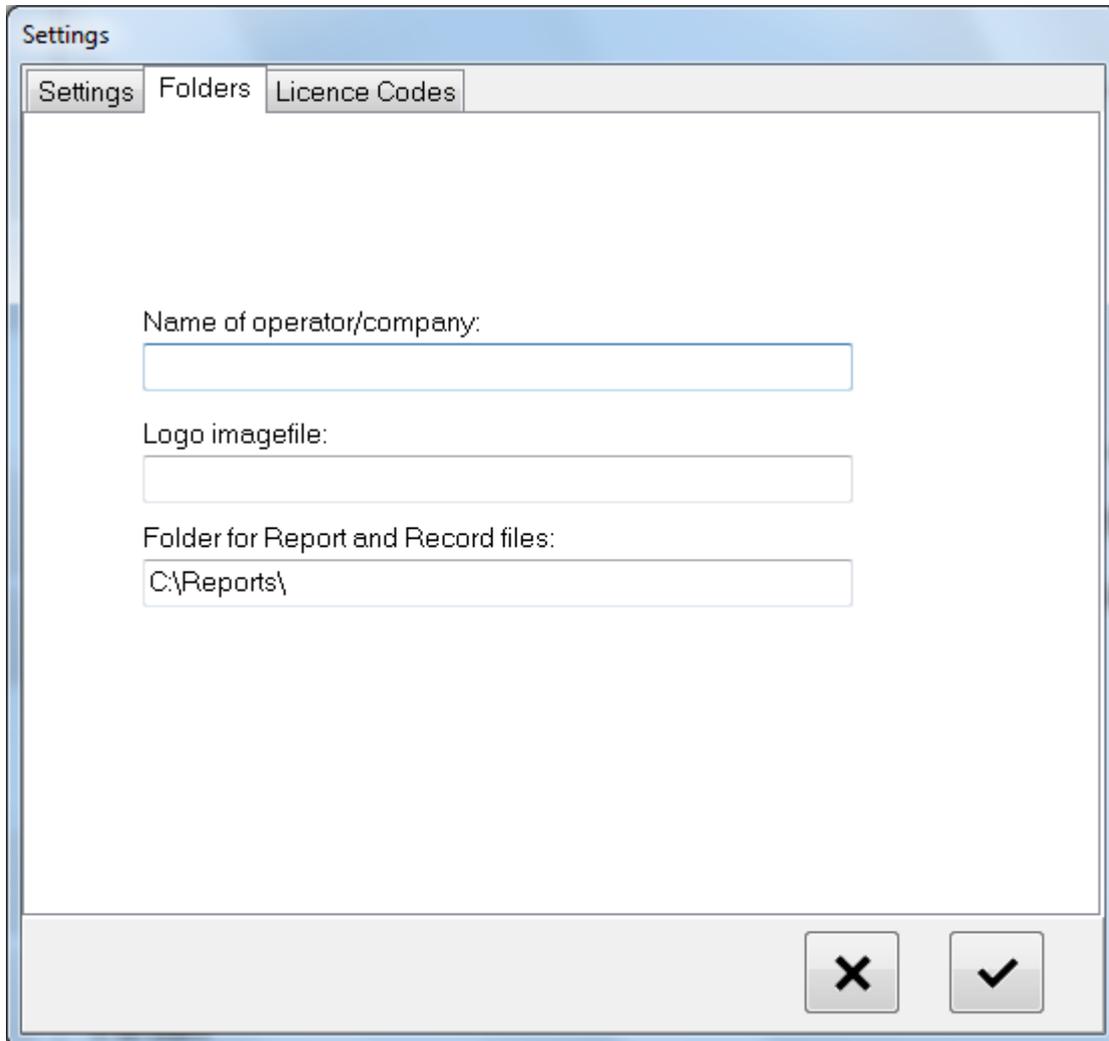
To convert a multi-channel counter to single channel version remove the channel dividers from the counter inlet. Fish can then be pumped directly into the counter via the upwelling inlet underneath the counter or netted directly into the inlet. The multi-channel outlet can be also be removed and replaced with the single outlet.

The counting program is changed between multi and single channel modes by checking the Multi-channel counting box as shown in the **Settings** screen below. The **Channel Labels box** are used to rename the counting channels (Counter 1, Channel 1, Small, Large, etc).

It is recommended to leave the program in multi-channel counting mode even when using the counter as a single channel counter. This allows the monitoring of the numbers of fish passing through each channel section within the counter to ensure that fish are spread evenly across the counter, maximising capacity



Folders



Settings

Settings Folders Licence Codes

Name of operator/company:

Logo imagefile:

Folder for Report and Record files:

X ✓

Here it is possible to enter the name of the operator and the company and an image file with the company logo to include in the Count Reports.

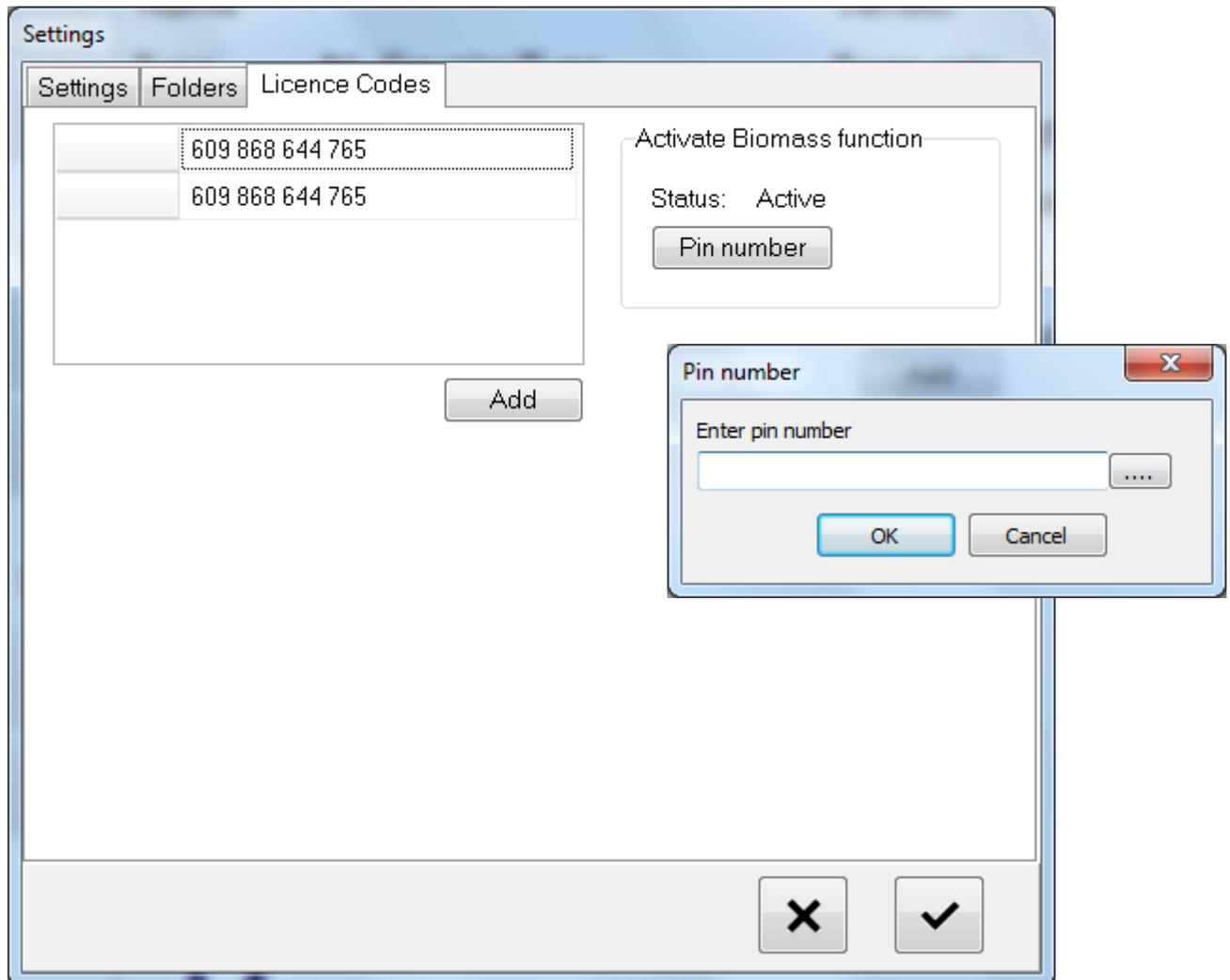
Folder for Report and Record file: shows where the folder is located that stores the report and image files created after a counting session. The present folder is C:\reports\.

Licence codes

This field shows current licence codes running on the counter.

“Active Biomass function” Indicates the status of the biomass function.

To Activate the Biomass functions insert Biomass pin number for this counter. The pin number is provided by the Vaki representatives who organised the sale and delivery of the counter.



Information

Vaki Micro/Macro Counter

Counter 1

2

30 g

START SESSION
Images
Report
Settings
Calibrate
Exit

Throughput
Video
Spread
Visibility
Information

Counter	Camera
Name	Vendor DALSA
Type Wellboat 2100 /1/2100	Scan rate 1116
IP addr 169.254.175.99	Light strength 1100
	Serial Number 13047151
Software	Licenes
Version 4.01.2	
CVB number 29971	Biomass estimation

Total

2

Counting

Counter:

Name: Name of the counter.

Type: Type of the counter. Wellboat, Micro, macro.

IP Adress: The computer IP Adress

Software:

Version: program version number.

CVB number: Common Vision Blox key nr.

Camera

Vendor: Vendor type.

Scan rate: Shows how many lines per second the camera is scanning.

Light strength: This value indicates the strength of the lamp. Normally this value should be 1000-1400. Should the value drop below 700 this suggests the lamp should be serviced.

Serial number: Serial number of the counter.

Licence

Biomass estimation

To buy Biomass Licence you have to contact VAKI and give up version, CVB number and Serial number.

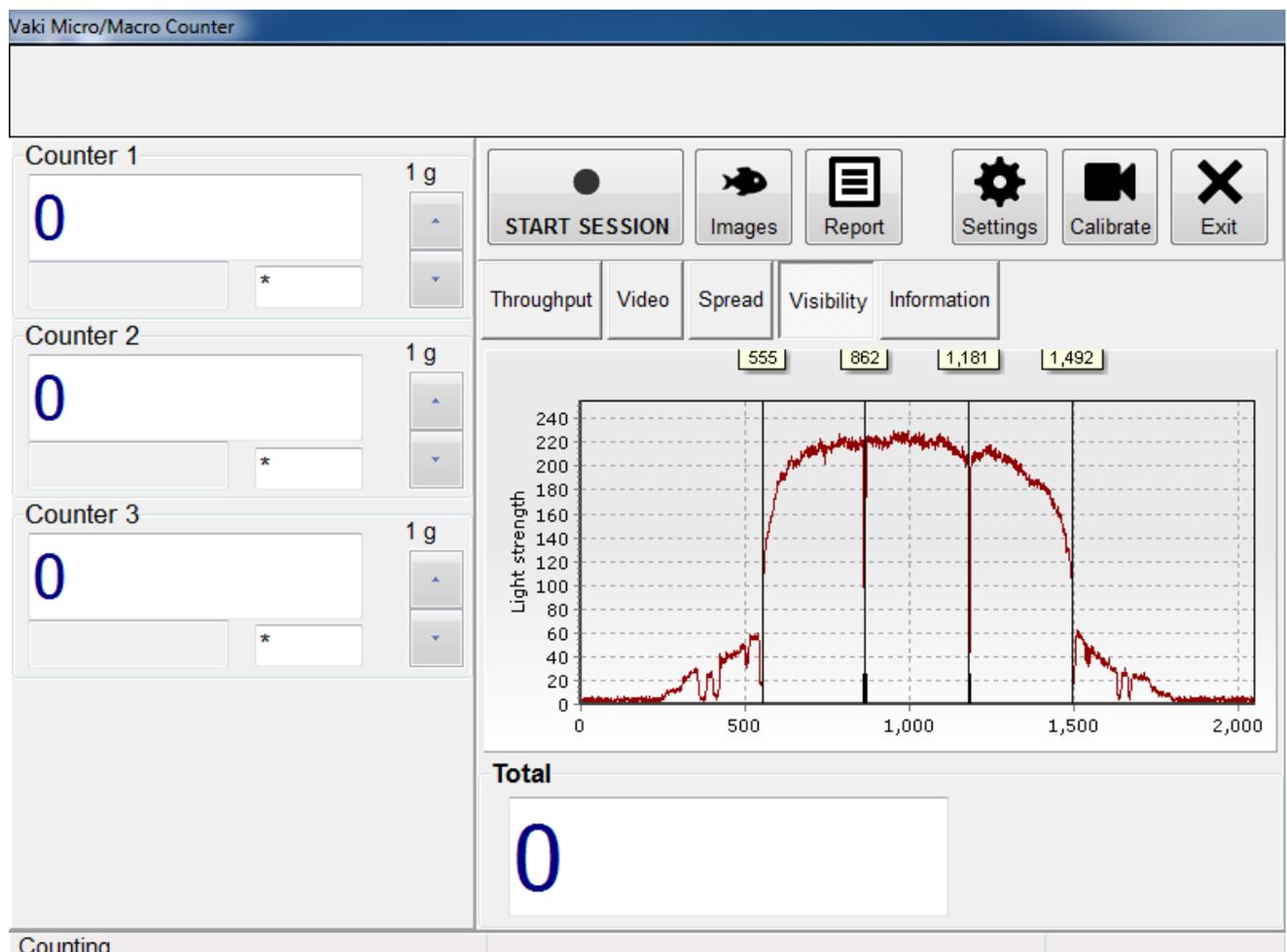
Calibration & Visibility

Each time the counter starts it carries out the following checks:

- The scanning area of the camera.
- That the counter detect all internal bulkheads
- The intensity of the light detected by the camera.

If the visibility is not acceptable, the following message will appear **“Insufficient visibility check again?”** To find what is wrong, push the **“Visibility”** button.

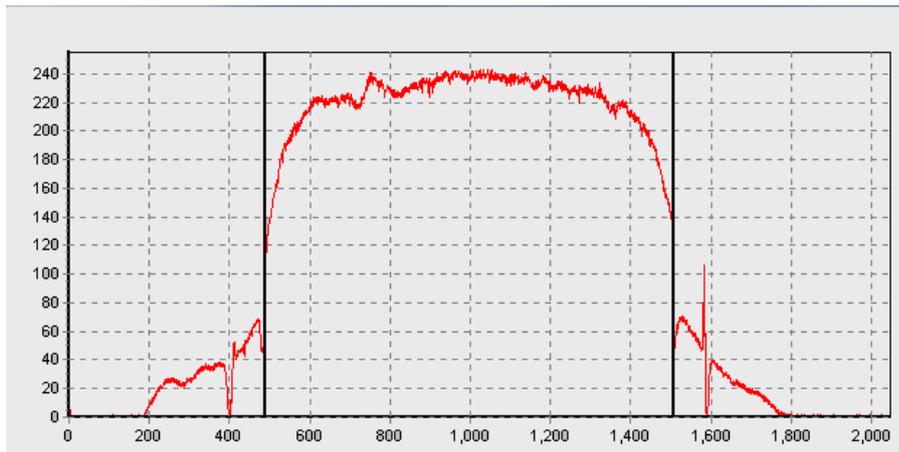
In the well boat counters there are no internal bulkheads, so there will only be defined one “counter” and only the side bulkheads are detected.



Visibility

Press **“Visibility”** button to show the visibility graph:

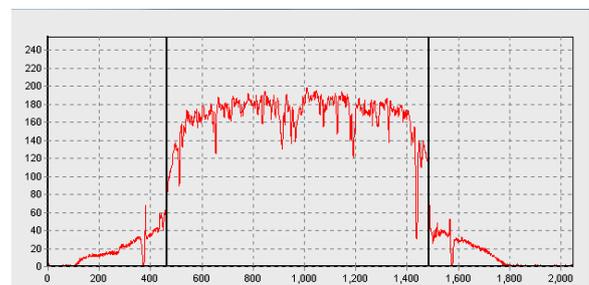
The black vertical lines indicate the edges of the area scanned by the camera, which should correspond to the inside edges of the counting channel.



The “**Visibility**” function is also used to check that the camera is correctly positioned and the amplification of the light is correct. It is also possible to check if dirt or residue blocks or disturbs the sight of the camera.

This diagram above shows how the graph should look in a single channel Macro. It shows the position of the edges of the scanning area with two vertical black lines. It also shows that the light intensity detected by the camera is even. The scanning area on this graph is the distance between 500 and 1500 on the x-axis, and on the y-axis, the strength of the light is approx. 220. The x-axis is the length of the scanning area in pixels (1 pixel = appx.0.55 mm). The graph for Micro should indicate 900 pixels (500mm) and the Macro 1,800 pixels (1,000mm). The y-axis is the strength of the light on scale 0 to 255. The counter ignores the area outside the edges. If the strength is under 180 or over 250, the counter must be re-calibrated. (See section: **10.2 Counter Calibration**)

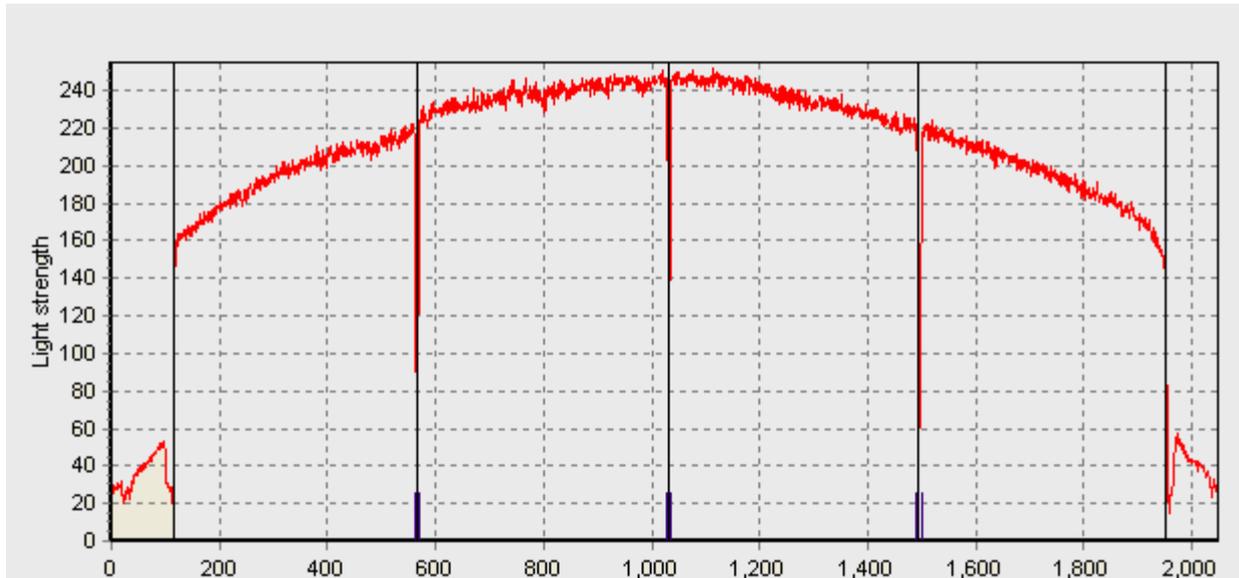
The diagram on the right shows how the graph can look when something disturbs the light. In this case, the reason may be humidity or dirt on the mirror. This would prevent calibration of the camera. In this case, it is necessary to clean the mirror.



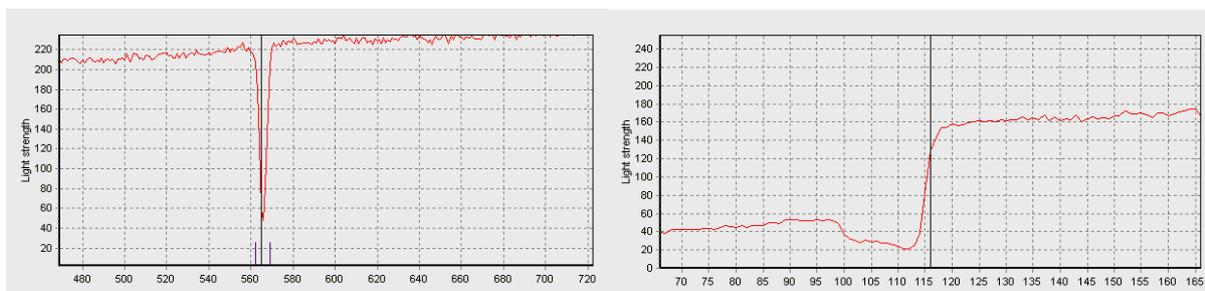
The black vertical lines should be positioned where the light intensity (shown by the red curve) falls steeply. If not it is necessary to re calibrate (see Counter Calibration).

Visibility graph

Below is the curve for a four channel Macro.

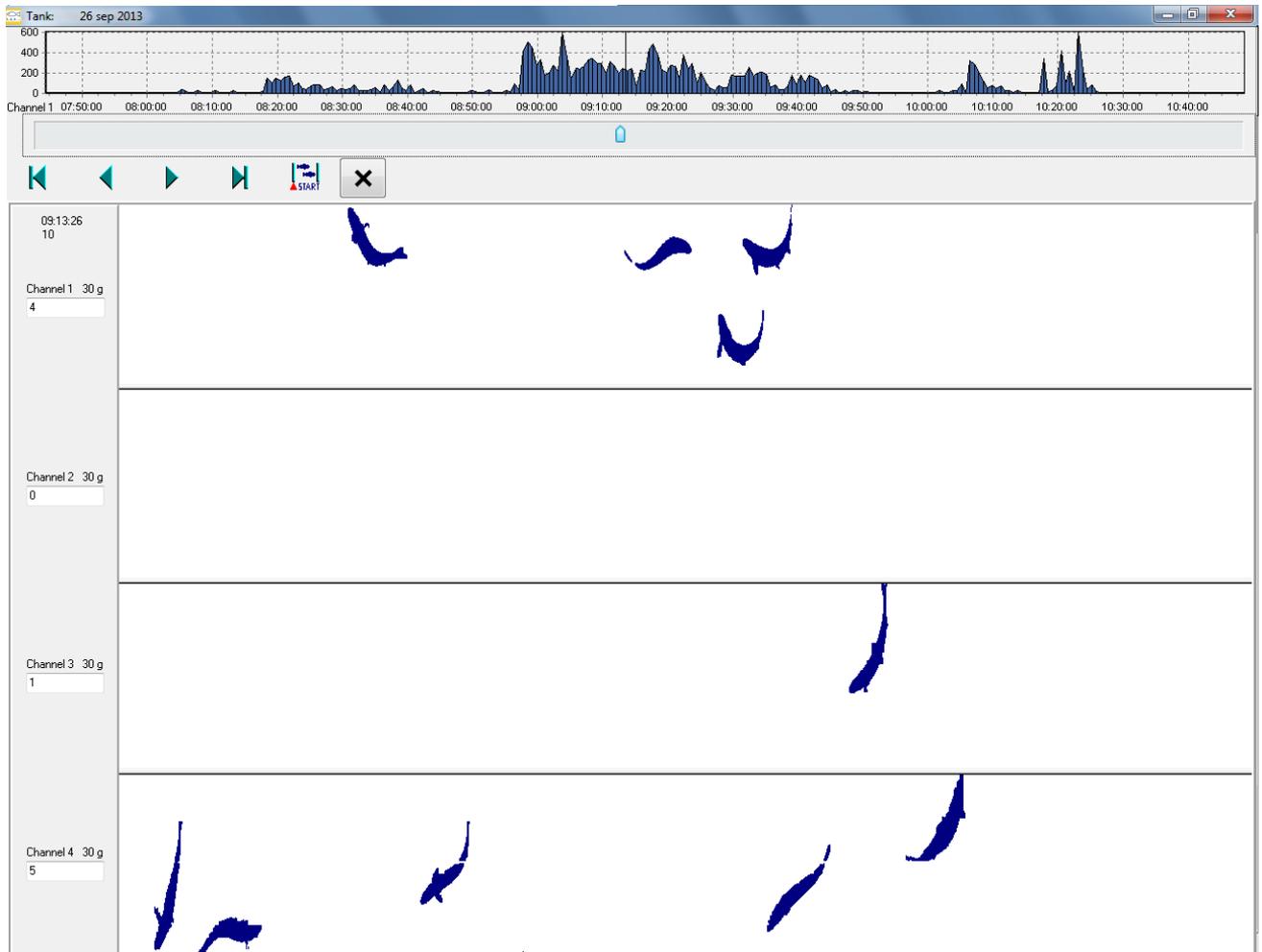


It is possible to zoom by clicking on the screen and drag the mouse.



If no red curve appears this may be caused by, no light source (lamp) or the counting head is not positioned correctly on the counter body.

View recording



To view the images stored press **“Record”** on the main screen. The files are labelled by date and tank name, open the file to be viewed from the list. Each screen shows a recording for around one-second interval.

The graph at the top of the screen indicates the rate of fish through the counter over time. Press the graph and a graph for the next counting channel will be shown.

 Buttons are used to move to the next screen

 Buttons locate the beginning and end of the recording.

Start/End button, is used to select a part of the recording to be counted.

The pointer indicates the location of the screen currently viewed and can be dragged to quickly locate a position in the recording.

“Close” to exit.

Technical specification

Material: Stainless steel (AISI 316L)

Light source: fluorescent light bulb

Power consumption: 110/220 V

UPS requirement: 80-100W

Size of outlet pipes: 8" outlet

2 standard widths

- 1.4m counting width
- 2.1m counting width

Fish size: up to 500g.

Capacity: 200-300.000 fish per hour.

Accuracy: 98%