

HATCHERY FEEDING SYSTEM

Model HFS-F

HATCHERY FEEDING SYSTEM (HFS)

This manual covers the use and care of the Hatchery Feeding System (HFS)

Please read these instructions carefully and retain for future reference.

Nutrakol Pty Ltd, Australia

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System Description

The HFS system is designed specifically for aquatic hatcheries. It was designed by hatchery and larvae expert with the intention to give the hatchery operator more versatility when dealing with the task of feeding larvae and juvenile aquatic organisms (fish and crustaceans). The control panel is easily operated through a user-friendly colored touchpad and controls up to 48 HFS feeders, either individually or as a group with the same feeding schedule.

The software allows the user to pre-program a series of feeding regimes that cater for the changing larvae requirements and can be used repeatedly for successive larvae production runs. Alternatively, programs can be easily customized for specific feeding requirements on the day. There is the option of pre-setting automatic adjustments to feed rates to meet changing needs i.e automatic increase in feeding intervals and food rations to match larvae growth.

The HFS periodically administers a small amount of microdiet to larvae culture tanks, which evenly spreads the daily feed allocation across the whole feeding period, and outside of working hours. This prevents the need to manually feed the larvae, and provides a more constant availability of microdiet when the larvae need it.

The HFS feeding regime reduces size variation between larvae due to food competition. Due to its 'air knife' manifold, it disperses the particles in a large area which enable all larvae an access to food particles. Moreover, due to very small amount of feed (minimum of 50 µg) per 'shot' and frequent feeding events (minimum of 1 event /minute), it minimizes diet wastage and reduces costs.

The HFS mechanism operates by using a low voltage (24v) piston solenoid to pull a slotted plate across the bottom opening of a hopper containing the diet. The moving plate rests on another smaller, stationary slotted plate. When not in operation, the slots on each plate overlap with the bars on the other plate, thus preventing the feed particles from falling through.

When the HFS operates, the moving plate is pulled horizontally between the hopper and stationary plate, followed by a return movement facilitated by the stainless steel spring. The feeder releases a small quantity of feed through the openings at the moment the slots line up, when passing in both directions. The plate can be pulled up to 9 times in any one feeding event, as often as every minute all day. The requirement for multiple operations depends on the microdiet flow characteristics and the amount of feed required.

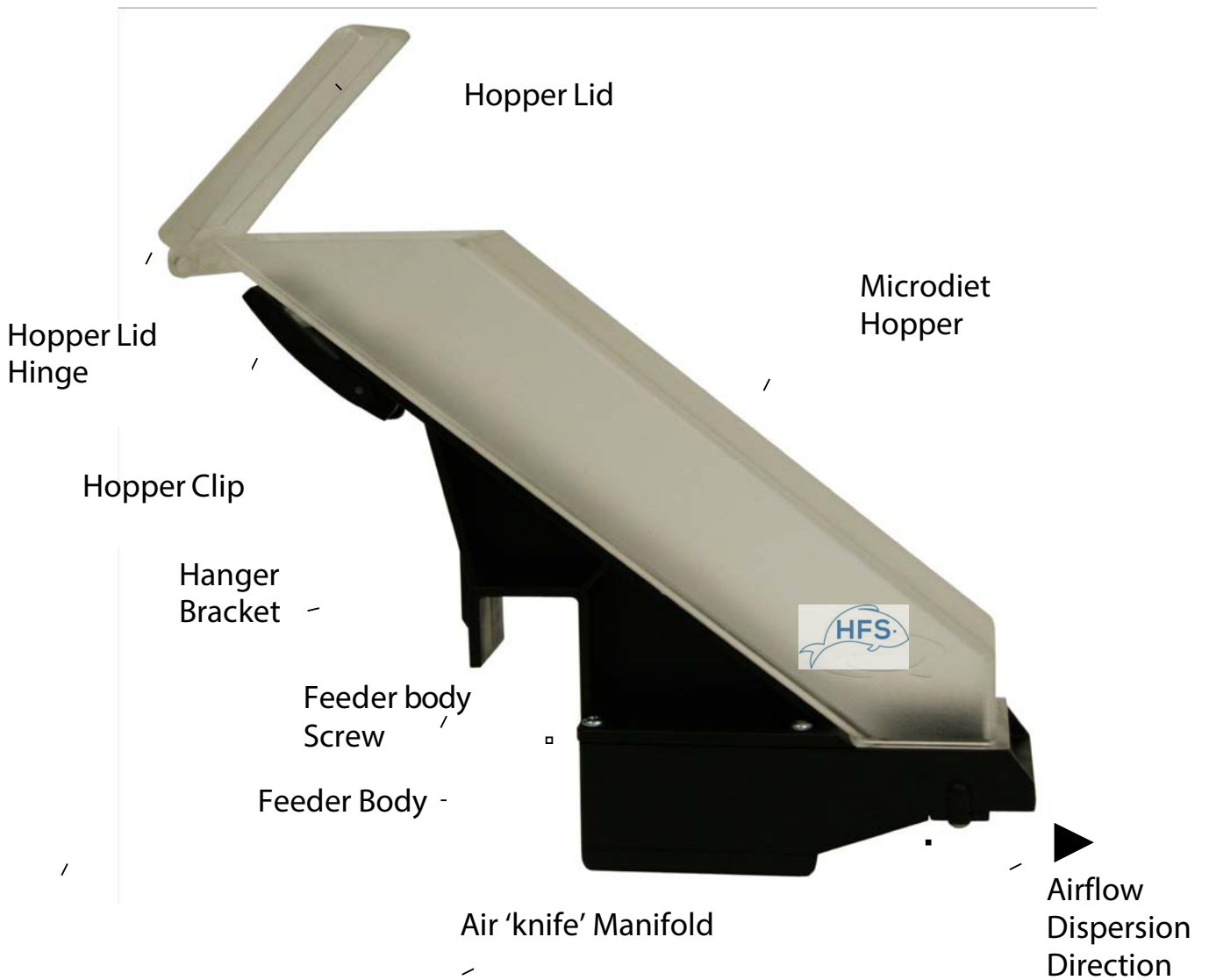
Limitation of Liability

Nutrakol Pty Ltd will not be liable for any direct, indirect, incidental or consequential damages of any type, including but not limited to any direct or indirect consequential, incidental, or special damages or loss, lost profits arising out of or in connection with operation and/or installation of the Hatchery Feeding System (HFS) including the inability to achieve a particular result, even if one have been advised of the possibility of the damage. Under no circumstances will Nutrakol Pty Ltd will be liable to the Customer for any amount and/or loss as a result of operating the HFS feeding system. This limitation of liability applies to all types of legal theories, including but not limited to contract, tort, professional liability, product liability, warranty or otherwise.

Indemnification

Customer agrees to defend, indemnify and hold harmless Nutrakol Pty Ltd and its representatives, agents, employees, subcontractors, officers, directors and others for all claims, losses or other liability or proceedings arising out of (a) the use of the HFS feeding system and (b) the effect, if any, on Customer third-party product warranties caused by having HFS feeding system operating on such third-party products.

HFS Feeder Features



Spring - Stainless Steel 316

Solenoid piston

Feeder Plate Screw

Controller Features

Color touch screen \

Remote
Access Unit

Emergency
Stop Switch \



\ Enclosure
Locks

Feeders Outlet RCA
Connectors



Feeder RCA connector

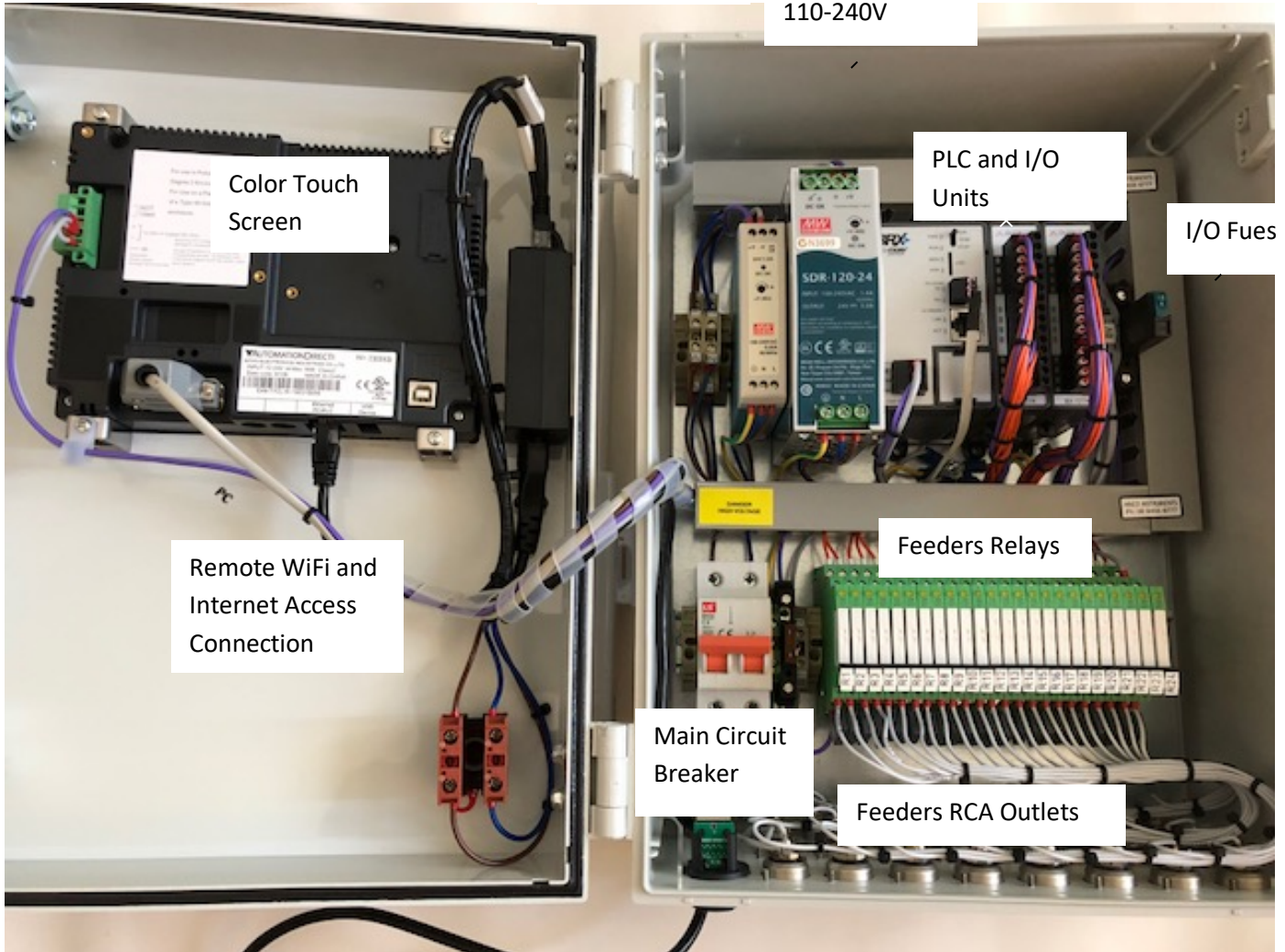
Internal Controller Components

Power Supply

24V DC

Power Supply

110-240V



SAFETY

- **115 - 230 Volt AC power is used and is a shock hazard.**
- Avoid opening the front panel unless the power is turned off at the general power outlet and the plug is disconnected.
- Power leads must be kept clear of any water, and connections kept dry to avoid any short circuits.
- A circuit breaker is installed inside the controller enclosure in the event of overload or short circuit, if the controller has no power, check for the cause and fix, then reinstate circuit breaker to power on.
- Do not install controller in areas with:
 - Excessive or conductive dust,
 - Corrosive or flammable gas,
 - Moisture or rain,
 - Excessive heat,
 - Regular impact shocks,
 - Excessive vibration.
- Ensure the connectors are covered to prevent contact with “live” wires.
- It is recommended that all HFS cords are located above head height to prevent trip hazards and being dropped into water.

1. **BEFORE YOU START**

i) Power

- The power source is **manually** switchable 115 -230 VAC, 10 A, ensure the correct voltage is selected.
- The power source must be earthed.
- The relays and feeders are operated by a 10A - 24 Volt DC power supply.
- HFS feeders are rated at 24 – 50 Watts each.

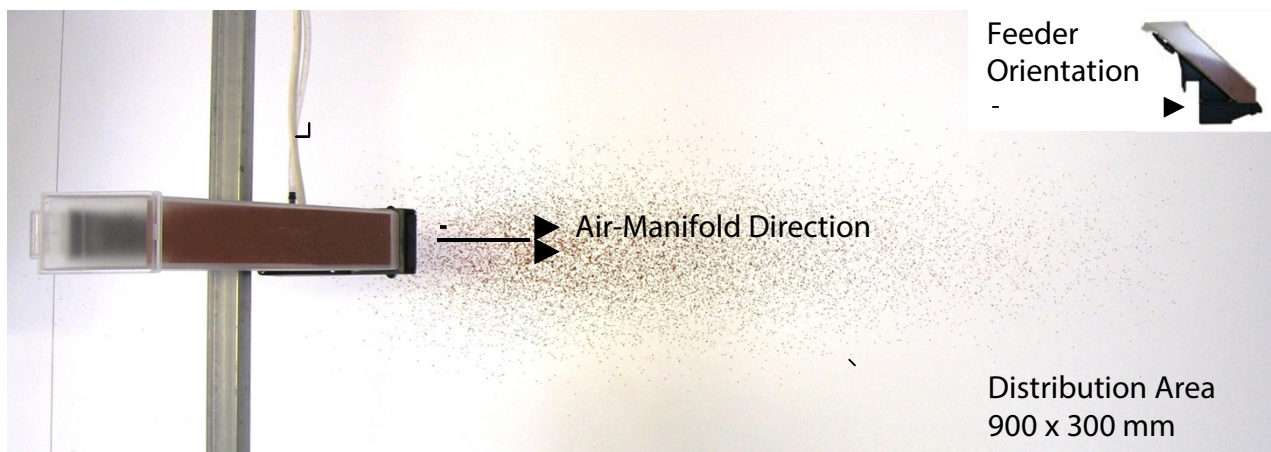
ii) Installation

- The control panel enclosure should be located off the floor and bench surfaces by mounting on a wall or bracket to allow free access to the bottom of the enclosure.
- The control panel should be placed in a clean dry environment away from potential water hazards.
- HFS feeders should be installed at a minimum of 200 mm above the water surface and should not be placed directly above aeration. HFS feeders should be hung from a bracket made from 25 mm square tubing that is fixed securely and level. Aluminum, stainless steel or plastic (HDPE) is recommended for the construction of the bracket, which can be hung from the ceiling or suspended on stands secured to the floor.
- The HFS feeders are supplied with a 1 m electric cord (2 wires, 24v), which can be connected to an extension cord of maximum length 50 m to the control panel. Extension cords will need to have RCA plugs **soldered** to the ends, one female and the other male, preferably gold plated for high corrosion resistance (spare set is supply with each HFS feeder). It is suggested that extension cables be kept dry and secure. 1mm double insulated cable is recommended for use when manufacturing these cables, in order to prevent an unnecessary voltage drop along the length. However, if shorter lengths are required a lesser-sized cable may be suitable, as long as it can carry 4 amps of 24 VDC current with negligible resistance.
- When disconnecting RCA plugs, do not pull them out using the lead, ensure that the plug is held.

2. SYSTEM OPERATION

Setup

The HFS feeders should be placed ≥ 200 mm above the water surface, away from splashing and not directly over aeration or air diffusers. Each HFS feeder should be installed over the tank directly above and to one side of the feed distribution area, as shown in the diagram below. The distribution area should be forward of the HFS feeder.



The feed distribution area for microdiet (300-500 μm particle size), for an HFS feeder set at 250 mm above surface and with 10 l min^{-1} airflow to manifold.

The HFS feeder should be directed towards the distribution area with sufficient airflow supplied to spread the feed particles evenly over the target area. If the airflow is insufficient the feed particles may clump and sink through the water column too rapidly.

The air supply should be low pressure (standard hatchery blower air pressure) and dry in order to prevent the feed particles from clumping and sticking to the plates. If a larger feed distribution area is needed the HFS feeder can be raised, or the airflow increased. The area covered may also depend on the microdiets physical characteristics.

If high pressure air supply (i.e. compressor) is used, a pressure valve is recommended to be installed. When normal hatchery air supply is used, a standard air valve to control the air supply (and therefore the distribution of feed particles) is needed.

When the HFS bracket is hooked over a beam ≥ 10 mm wide, it is designed to hold the feed hopper at a 40° angle from horizontal. This prevents the feed from being compacted onto the feeder plate and allows a more uniform allocation of particles for the duration of the feeding period. The beam needs to be fixed securely and level to ensure that the AMD units perform as replicate dispensers.

The feed should rest loosely in the feed hopper as shown in the diagram below. The feed should be prevented from compacting onto the feeder plate or reduced performance may occur.



Feed Types

All commercial feed types listed below have been tested and can be administered by the AMD:

- Micro particulate diets within the size range 50 μm to 1.5 mm.
- Extruded pelletized diets within the size range 100 μm to 1.5 mm.

Aliquot Delivery

The aliquot size inherently varies between different microdiets and it is dependent on each of the individual microdiets flow characteristics. This can change with moisture content, freshness, environmental conditions, the microdiet particle type and size, the ingredients in the diet (i.e. % of lipid inclusion), and the manufacturing methods. Despite these differences the aliquot size of most diets is able to be determined and therefore the amount fed over an entire feeding period can be controlled.

Generally, the diet will flow through the HFS feeder at the slowest possible rate when a single-action ('shot') feeding program is used, in conjunction with a single slot (plates 00 and 0). This program is appropriate for diets that have relatively fast flow characteristics, usually with particle size $<150 \mu\text{m}$. Daily maintenance of the feeders is recommended when using sticky diets. This involves simply shaking the diet loose back up the hopper and allowing the diet to naturally fall back into place. A fine brush can be used to clean the plates and allow the diet to fall more freely through the openings.

Calibration

If accurate microdiet feeding is required it is suggested that the average aliquot weight of each microdiet and size class be determined. This will allow the user to calculate the required number of feeding events to dispense the daily ration within the desired time. The sum total number of events in 4 feeding periods should be equal to one day's allocation.

The feeder should be operated 10-20 times over a container that is positioned to catch the dispensed diet. The average aliquot is then calculated.

Average aliquot weight calculation:

Average Aliquot Weight (g) = Dispensed weight (g) ÷ Number of Shots

Number of shots required per day:

Daily Shot No. = Daily Food Ration (g) ÷ Average Aliquot Weight (g)

Automatic adjustment to feed rates

Feeding rates and amounts can be automatically changed over time to match larvae growth. To set this option, feeding programs need to be pre-programmed to the required feeding setting of each stage. The automatic adjustment (through 'Auto Advance' screen) will allow the user to set the sequence of feeding programs and time. Programs can be set to change up to a maximum 255 hours apart, with 12 changes able to be set. For example, program #1 will be set for 2 feeding events every hour and program #2 will be set for 4 feeding events every hour. Feeding regime will start with program #1 and after 48 hours the system will advance to program #2. Therefore, for the first 48 hours the designated feeder will feed every 30 minutes. After 48 hours the designated feeder will feed every 15 minutes.

Loading Microdiet

When loading the microdiet into the feeder's hopper there are a few simple rules that need to be followed in order for accurate and reliable dispensing of the microdiet to occur.

1. The microdiet must be gently allowed to fall down the hopper and onto the feeder plate. This prevents the microdiet from being compacted onto the plate, which can cause a plug of diet to form and stop the feeder from operating. This is most important when very fine (<300 µm) diets are being used.
2. There is a maximum amount of each diet that can be reliably fed in one session. No commercial diets tested have stopped flowing through the feeder, however if a diet does stop flowing it is usually because there is too much in the hopper, which causes

compaction. Therefore, if the feeding period requires more microdiet than is able to reliably flow through the feeder, then two feeding sessions in that period must be used (i.e. the feeder can be loaded in the morning and then re-load in the afternoon to prevent overloading). The afternoon allocation is generally given more than is needed to finish off the days feed, which leaves some microdiet in the hopper for start of feeding the next day.

3. MAINTENANCE

Cleaning

Cleaning should be done every day in order to ensure reliable operation of the HFS feeders and prevent the buildup of old diets on the working parts.

Best results are achieved with a high-pressure air nozzle. Safety glasses should be worn during this procedure. The hopper should be removed and blasted through with air, and the feeder plate and base plate should also be cleaned using this method. Any loose feed particles in the HFS feeder can also be removed using this method.

Alternatively, a soft brush can be used to clean the plates and a bottle brush for the hopper. **Do not** use a wire brush.

- If an HFS feeder is accidentally submersed in water, turn power off, unplug the feeder from control panel and dismantle the feeder. Flush the solenoid with deionized water to remove any salts and then use alcohol to disperse water. Dry as quickly as possible and spray with non-toxic water dispersant and anti-corrosion spray.

Storage

The HFS feeders should be disconnected and stored in a clean dry environment when not in use. Thorough cleaning of the units should be done before storing them. It is recommended to remove the solenoid piston (part 2 on parts list), wipe clean and ensure dry. ***Do not lubricate solenoid piston.***

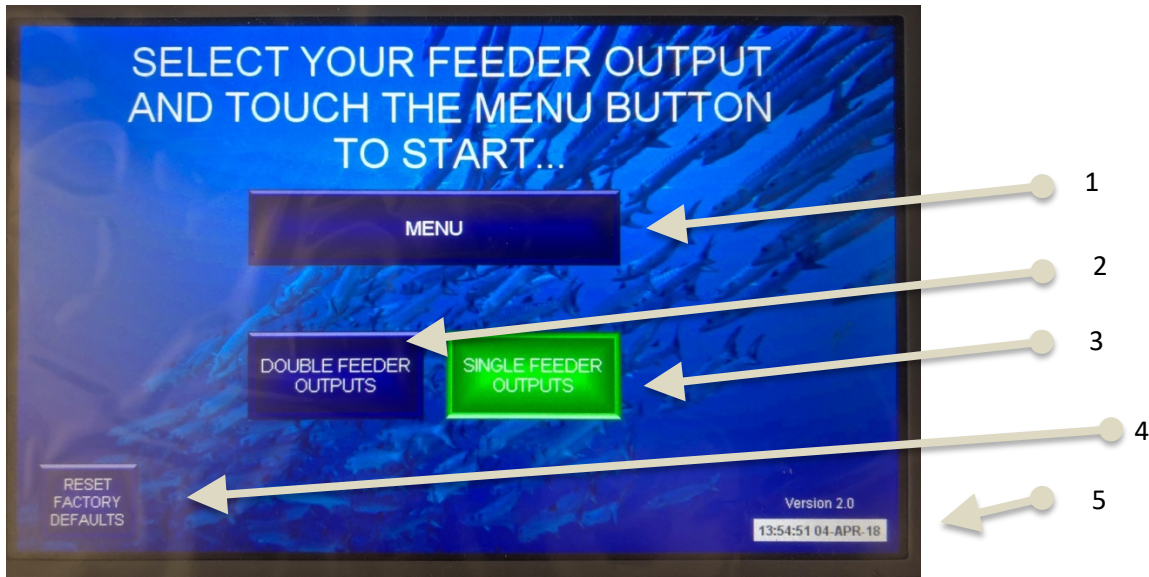
Do not leave un-operated HFS feeder above a tank or in humid environment.

The HFS solenoids are expected to last at least 1 million repetitions, therefore correct use and maintenance should ensure long lasting service.

4. Operating Instructions

Home Screen

The home screen is displayed when the unit is turned on. When the system has been restored to factory defaults. You will need to select whether you are using single feeders or double feeders in order to continue.



Once you select the type of feeder you will be using. The menu button appears which allows you to continue.

1. Menu Button links to the Main Menu screen
2. Press Double Feeder Outputs if you are using any double feeders. (Two feeders in one channel)

Note: This limits the amount of active feeder outputs at any given time to 2. This function staggered the feeders in 1 second time slots to prevent power overloading. If you select single feeders when you are using 2 feeders from the same outlet, you will likely blow the 5A blade fuse due to several feeders activating at the same time which will draw too much current for the power supply.

3. Press Single Feeder Outputs if you are using single feeder outputs. (One feeder per channel/outlet)

Note: This will set the amount of active feeder outputs at any one time to 4 (i.e. 4 feeders, regardless of which outlet will be activate at the same time).

4. Hold the Reset Factory Defaults button for 3 seconds to reset all program settings to factory defaults.

Note: This will not reset any IP address clock settings.

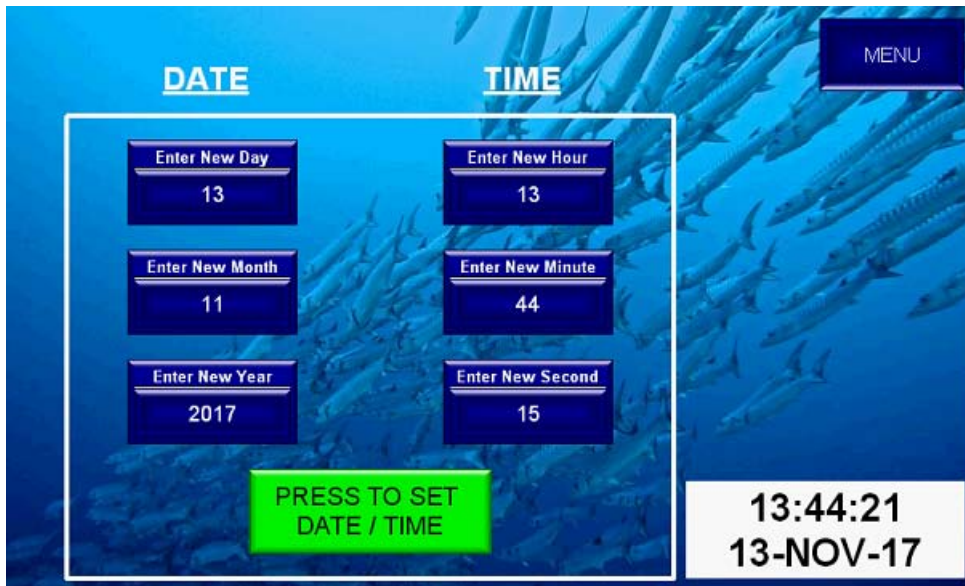
5. Display of the current system time. This is on all pages.

Main Menu



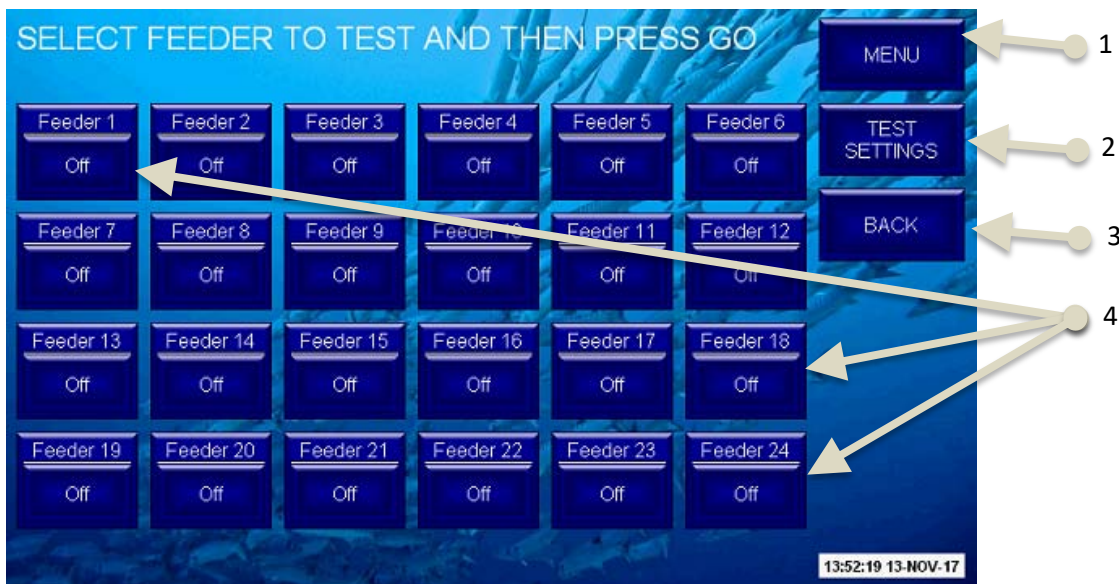
- 1.** Home Button links to the Home screen.
- 2.** Test Feeders Button links to the Test Feeders screen.
- 3.** Opens the Set Clock screen.
- 4.** Back Button links back to the previous screen.
- 5.** Program Edit Button links to the Program screen. This is where you set start times and feeding periods
- 6.** Feeders Button links to the Feeders screen. This is where you allocate feeders to a program number.
- 7.** The Enable / Disable Feeders pushbutton will start / stop all feeders from running. This is primarily for maintenance purposes so that the user can work on feeders without interrupting the program or risk injury.
- 8.** A red cross indicates that the feeders are off and a green tick indicates feeders are on. This will change with the pushbutton

Set Clock



This screen is self-explanatory. The current date and time are loaded into each setting so that you don't have to enter every parameter if you only need to change one thing. The clock in the bottom right may take a few seconds to update after you press the green "Set" pushbutton. The clock is in 24 hour format.

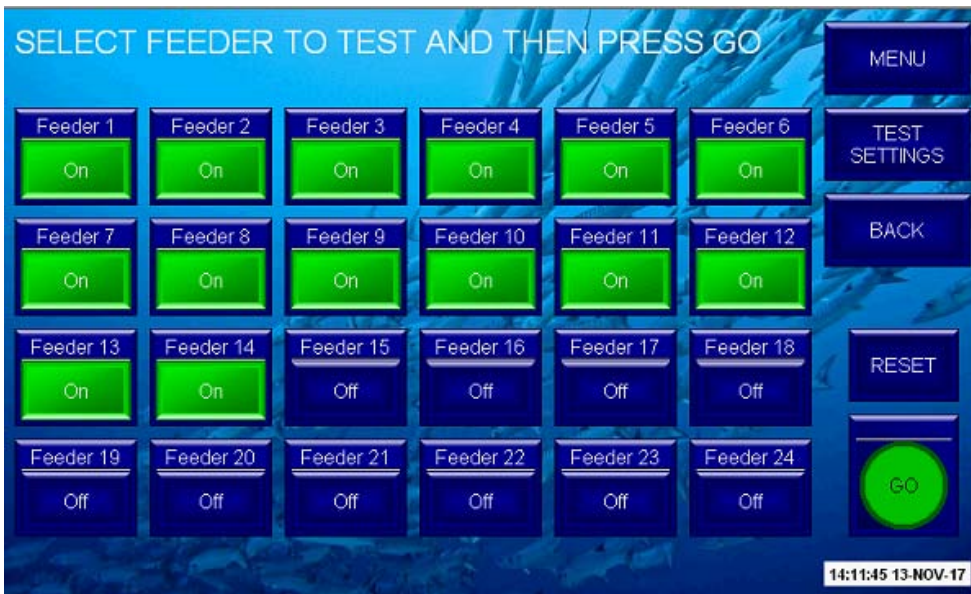
Test Feeders



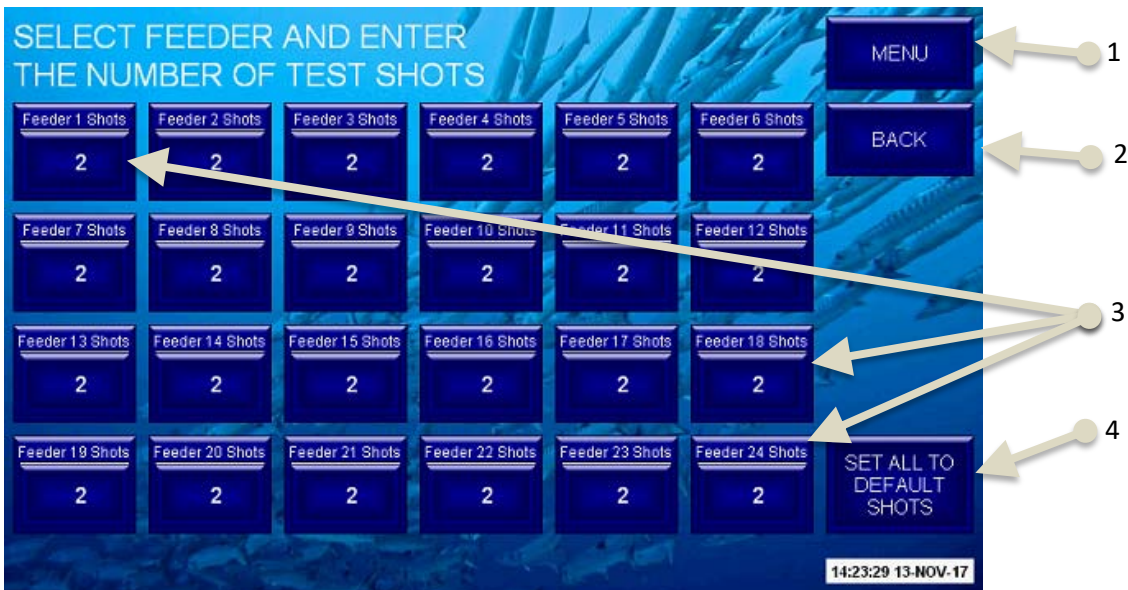
1. Menu Button links to the Main Menu screen.
2. Test Settings Button links to the Test Settings screen.
3. Back Button links back to the previous screen.
4. Pushbuttons for feeders 1-24. You can select as many feeders to test at the same time as you like.

Once you have selected the feeders you wish to test, press the "GO" button. The system will then perform the test shots and cycle through 2 or 4 feeders at a time. The system will perform 2 shots

per feed by default but this can be changed in the Test Settings screen. Pressing "RESET" will clear any selected feeders.

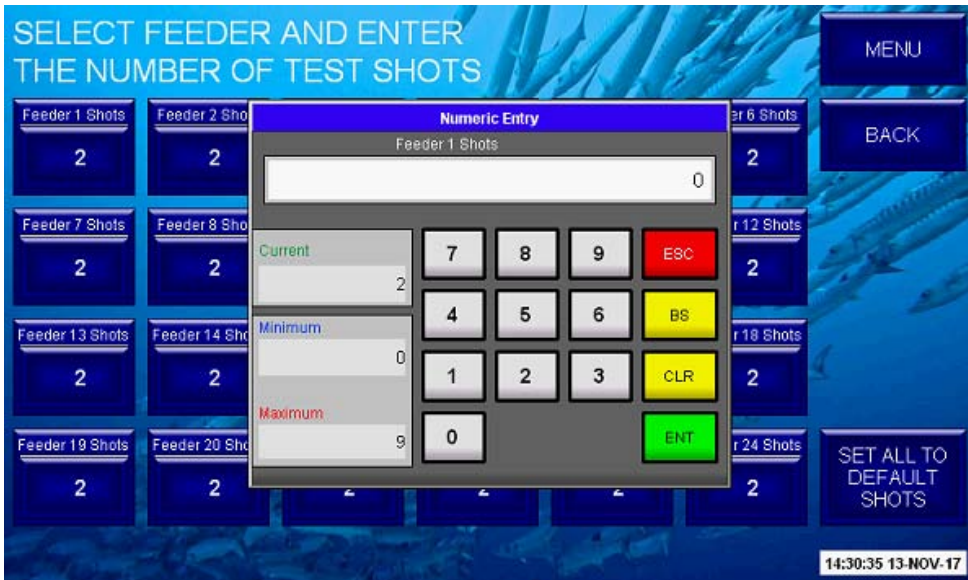


Test Settings



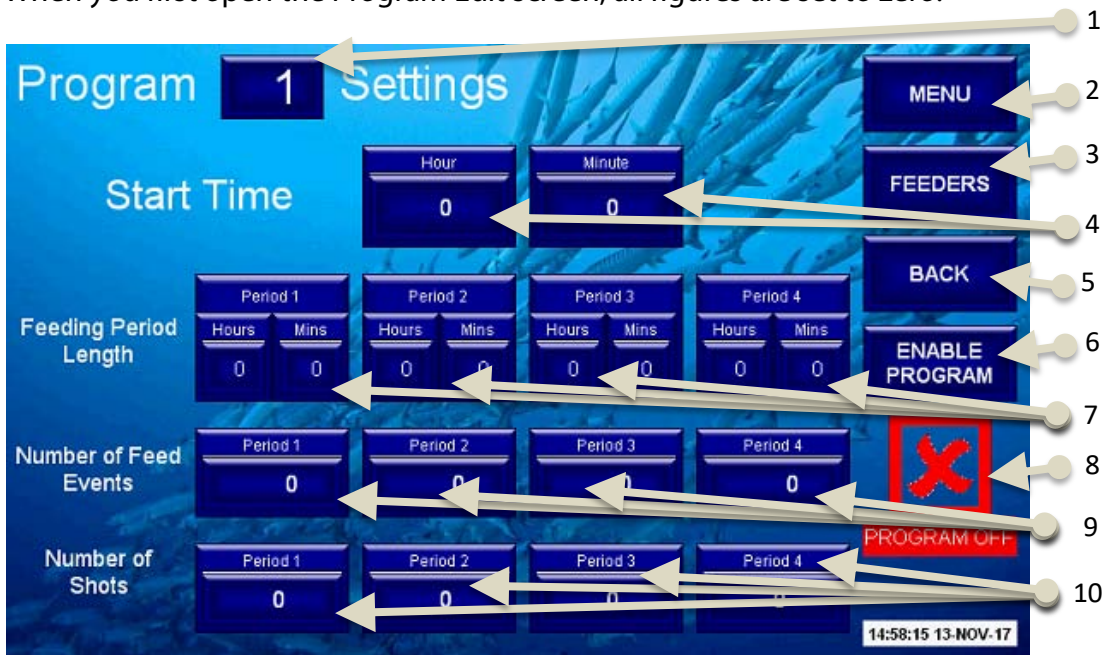
1. Menu Button links to the Main Menu screen.
2. Back Button links back to the previous screen
3. Pushbuttons for feeders 1-24. You can select up to 9 shots per feeder. If you set zero, then nothing will happen
4. You can set all feeders back to the default test shots which is 2.

Once you press the feeder number you want to change, a keypad will appear. Enter a value from 0 to 9 and then press the green "ENT" button to accept the new value. Pressing "ESC" will exit the keypad without saving.

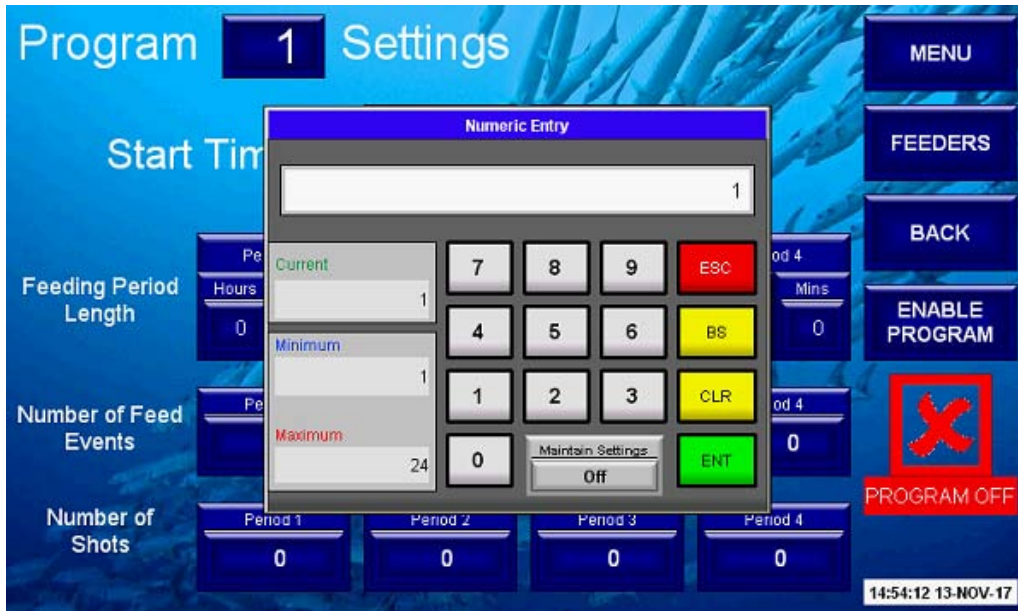


Program Edit

When you first open the Program Edit screen, all figures are set to zero.



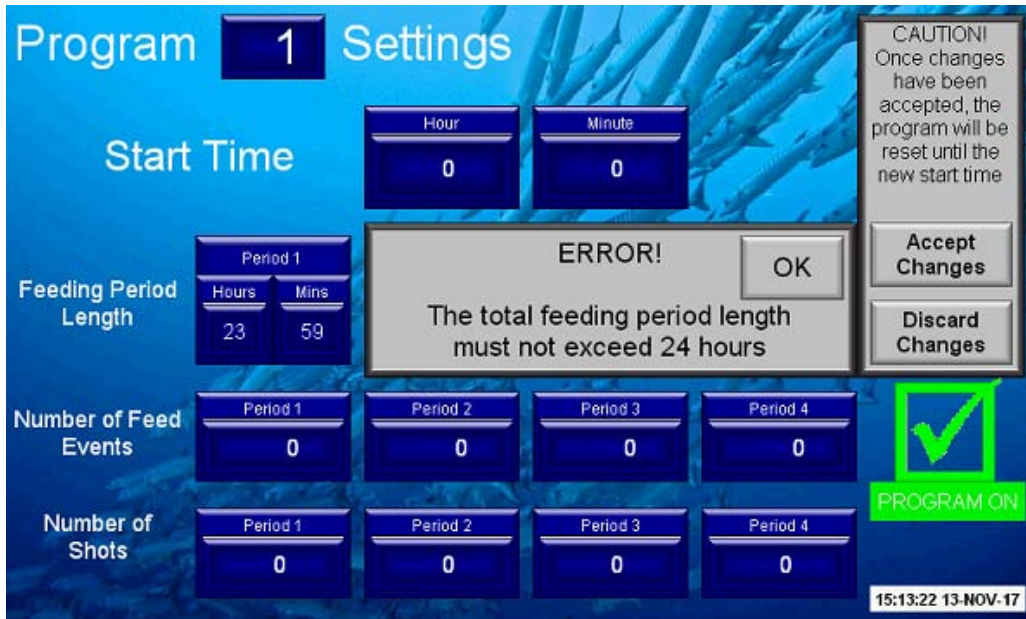
1. The program number currently being edited. Press this to open up a keypad and enter the desired program number. Nothing will happen if you leave this set to zero.



Pressing the “Maintain Settings” button will copy the settings from the current selected program into the newly entered program.

2. Menu Button links to the Main Menu screen.
3. Feeders Button links to the Feeders screen. This is where you allocate feeders to a program number.
4. Enter the hour and minute you want the program to start in 24 hour format. The first feed event will be at this time.
5. Back Button links back to the previous screen.
6. Each program must be turned on by using the “ENABLE PROGRAM” pushbutton. If the program isn’t turned on, then nothing will happen when it’s meant to start. Users can enable or disable individual programs to stop certain feeders or areas without needing to set everything to zero. If a program is in operation when the disable button is pressed, then the program will exit and wait until the start time matches the system time.
7. Press to set the hours and minutes for the length of feeding periods 1 to 4. The total length of all four feedings periods must be less than 24 hours. You will get an error message on the screen if you try and make the total longer than 24 hours. Press “OK” and then reduce the length. Accepting changes won’t work if you don’t correct the error first.

Note. A 24 hours period can be divided up to 4 feeding periods for example, morning, noon, afternoon, night. Each period can have different feeding regime. For example, during the morning, when larvae are empty of food, higher feeding ratios (more feeding events) while in the afternoon, lower feeding events.



8. The screen will display either get a Red X or a Green tick depending if the program is enabled or disabled by the Enable/Disable pushbutton.

9. Press to set the number of feed events for feeding periods 1 to 4. The number of feed events must not be greater than the total number of minutes in the feeding period length. For example, if your feeding period is 1 hour and 5 minutes, then the most amount of feed events you can set will be 65 (i.e. feeding event per minute). If the number you enter is too high, then the value will be set to zero and an error message will appear.

10. Press to set to number of shots for feeding periods 1 to 4. This is how many times the feeder will pulse each time a feed event is due.

Program Sequence:

Each feeding period will run for the set length of time and then move on to the next period. Once all periods have been completed, the system will wait until the start time matches the system time before starting again. You can ‘trick’ the system start time by changing the clock but not the feeding periods as they run on individual timer channels.

If any feeding period length or number of feed events are set to zero then that period will be finished as soon as it starts and the program will move on to the next feeding period. If the user wishes to create large breaks between feeds they can set the period length with at least 1 feed event and set the number of shots to zero. For example, if you wish to have 2 feeding periods, one in the morning and one in the evening, set period #1 to 4 hours (with required feeding events), period #2 to 6 hours (1 feeding event and 0 shots) and period #3 for 6 hours (with required feeding events). The system will feed in the morning for 4 hours, then stop for 6 hours and then start again for 6 hours.

Understanding the feeding program: The feeding periods programming works by dividing the total period length in minutes by the number of feed events which gives the feed interval time. Each time the interval time passes, the system will output the set number of shots for that period. For example, if a feeding schedule of a ‘shot’ every 10 minutes is needed for a period of 4 hours; set feeding period length to 4 hours (240 minutes) and set the number of feeding events to 24 (240:24=10).

Accept Changes:

Once you have made the desired changes, you will need to accept them. This is so that you don't disturb the program every time you change a parameter if it's currently operating. Once you do accept the changes, the program will stop operating and wait for the new start time i.e. if the start time is 08:00am, the system will only start feeding the next day at 08:00am. Note that the Enable/Disable pushbutton works independently of the accept changes and will go on and off as soon as you press it.

Discard Changes:

If you have made changes that you don't want to load into the program then you can discard changes. Pressing this button will load the current accepted program settings into the displayed values.

Program Examples:



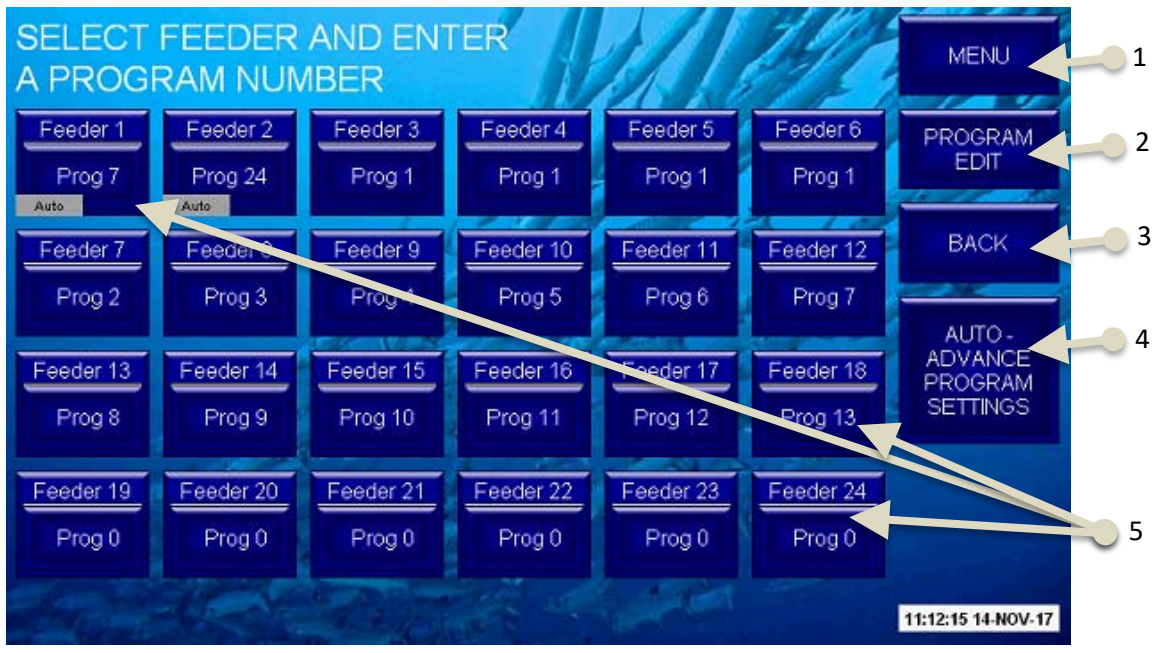
This program will start with feeding period 1 at 8:30am and pulse all feeders allocated to program 1 with 1 shot every minute for 1 hour and 30 minutes. Then the program moves on to feeding period 2 and there will be a break from 10:00am until 2:00pm. At 2:00pm, feeding period 3 starts and there will be 2 pulses every 15 minutes until 4:30pm (The last shots will be at 4:15pm). At 4:30pm, feeding period 4 will start there will be 5 shots every 2 minutes until 5pm. (The last shots will be at 4:58pm.)

The program is then finished and will wait until 8:30am the following day to start again with period 1.



This program will give even feeds throughout the whole day and night. The start time in this situation will make no difference to normal operation and only matters for the first day the program is enabled. At 8:00pm the program will start and the system will pulse 2 shots to all feeders allocated to program 2. Every 30 minutes (actually every 29 minutes and 58.75 seconds) another 2 shots will be pulsed with the last shots being pulsed at 7:29pm the following day. At 7:59pm, the program will complete and then restart with another 2 shots at 8:00pm.

Feeders

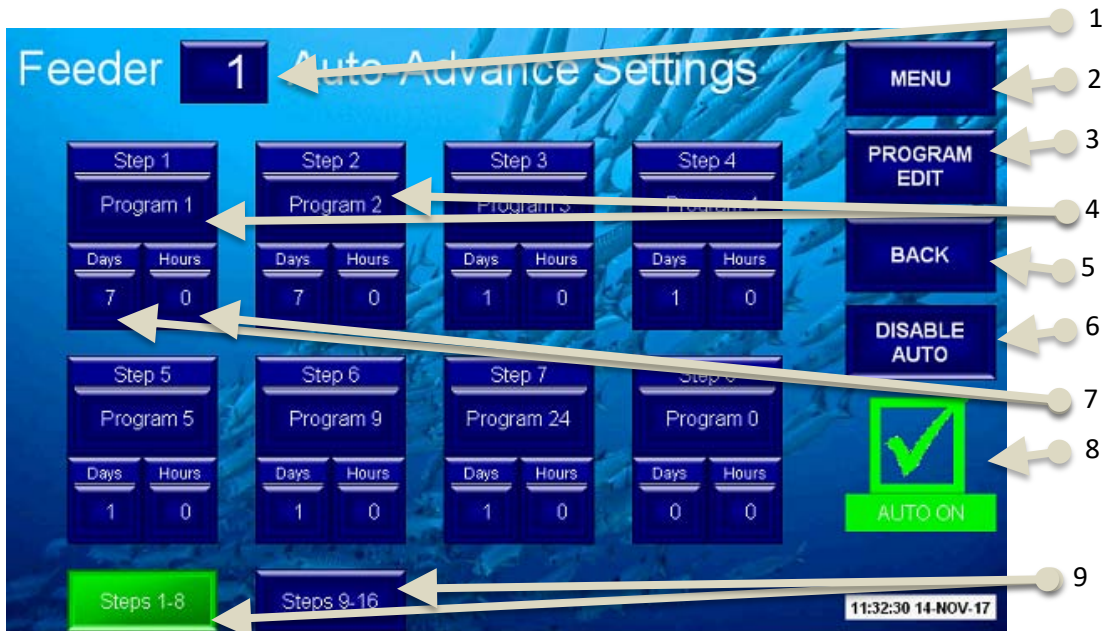


1. Menu Button links to the Main Menu screen.
2. Program Edit Button links to the Program Edit screen.
3. Back Button links back to the previous screen.

4. Auto-Advance Button links to the Auto-Advance Settings screen.

5. The programs currently allocated to feeders 1 to 24. Press this to open a keypad and change the program manually. A small "Auto" box will be displayed if the auto advance feature for that particular feeder has been enabled through the Auto-Advance Settings screen.

Auto-Advance Settings



1. The current selected feeder. Pressing this will open a keypad to select the desired feeder.

2. Menu Button links to the Main menu screen.

3. Program Edit Button links to the Program Edit screen.

4. The program allocated for each step of the auto-advance. There are up to 16 steps and the system will stop moving on to the next step if the program for that step is zero. You can 'jump' between programs in any order and there is no need to move in sequence e.g. 1 to 2 to 3 and so on.

5. Back Button links back to the previous screen.

6. The Enable/Disable Auto pushbutton will turn the auto advance feature on or off. If Auto is set to on when you make changes, you should turn it off and on again before leaving this page to ensure that the accepted settings are loaded correctly. Any time the auto is turned on, the program set in step 1 will be loaded to that feeder. Any time the auto is turned off, the feeder will stay on whatever program it was already on.

7. The length of time that the feeder will be on this program before moving to the next step. The maximum time

8. The screen will display either get a red X or a green tick depending if the Auto-Advance for the selected feeder is enabled or disabled by the Enable/Disable pushbutton.

9. Use the pushbuttons down the bottom to jump between settings for steps 1-8 and 9-16.

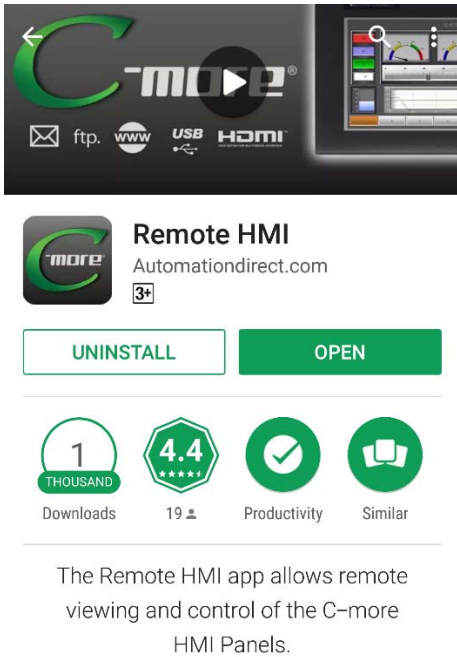
6. Remote Access and Control

Mobile Remote Application

This method is the most convenient way to access the touch screen remotely. You can use the app over your local network or over the internet.

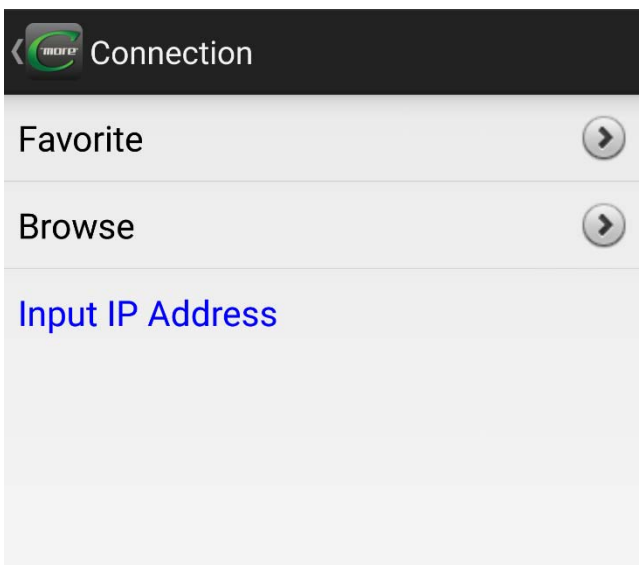
Step 1

Download the application titled “C-More Remote HMI.” The app is available on android devices as well as Apple devices.



Step 2

Open the app and you can input an IP address to connect once off. The IP address is: 203.59.9.22. I suggest adding the panel details to your favorites so that you don't have to enter the IP address every time.



Add Favorite

Name

Panel

11102

IP Address

Password

Username

Password

Register password

CANCEL DONE

Enter all of the details. The port default is 11102.

The default username and password are "admin". If you check the box to register password, it means you won't need to login each time.

Add Favorite

24 Feeders control box

Panel

11102

203.59.9.22

Password

admin

.....

Register password

CANCEL DONE

Step 3

Pressing "DONE" will connect you to the system, you can change parameters as you wish. **You need to double click on the unlock button on the right side to unlock button before you can make changes.**



Section 6 **TROUBLESHOOTING**

Symptom	Fault	Solution	comment
No power to controller	Not plugged in properly	Check power cord is correctly plugged into general power outlet	
No Power to Controller	Circuit Breaker	Check the circuit breaker switch is turned on. If the circuit breaker switch has been tripped check for electrical faults or short circuits (live/neutral or live/earth) before turning back on.	There is no Residual Current Device installed in this controller, therefore power should be turned off at mains before opening the enclosure.
Feeder Not Dispensing	Relay contacts loose or relay faulty	Check wires to specific relay. Check relay light.	
Feeder Not Dispensing	Plate jammed	The plate mechanism may need cleaning. The solenoid piston may need cleaning.	
Weak Feeder Operation or Not Operating	Excessive resistance in circuit	Ensure the connectors are clean. Ensure the connectors are completely pushed in. Check solder joints in connectors. (All feeders are factory tested). Cable should be heavy enough to carry 4 Amps of current, 24VDC	Note. Cable lengths up to 35 m of 1.0 mm ² copper core should not present any significant voltage drop (<5%), providing the solder joints are correctly soldered . Check the circuits for resistance it should be <1.5 Ohms. Ensure that connections are made away from wet or humid environments and are kept dry and clean.
Diet Not Being Dispensed Properly	Diet is wet	Ensure the feeder is not splashed by any water. Ensure the plate mechanism is kept dry. Ensure the feeder is mounted >300mm above the water surface. Ensure the feeder is not mounted above tank aeration. Only clean feeder plates with a dry soft brush or with a blast of dry compressed air. Only pass dry air through the feed-dispersing manifold.	
Diet Not Being Dispensed Properly	Overloading hopper	Ensure that the diet is not compressed into the hopper. Ensure that the hopper is filled (especially very fine diets) only to the natural fill level when the hopper is at 40 degrees from horizontal.	

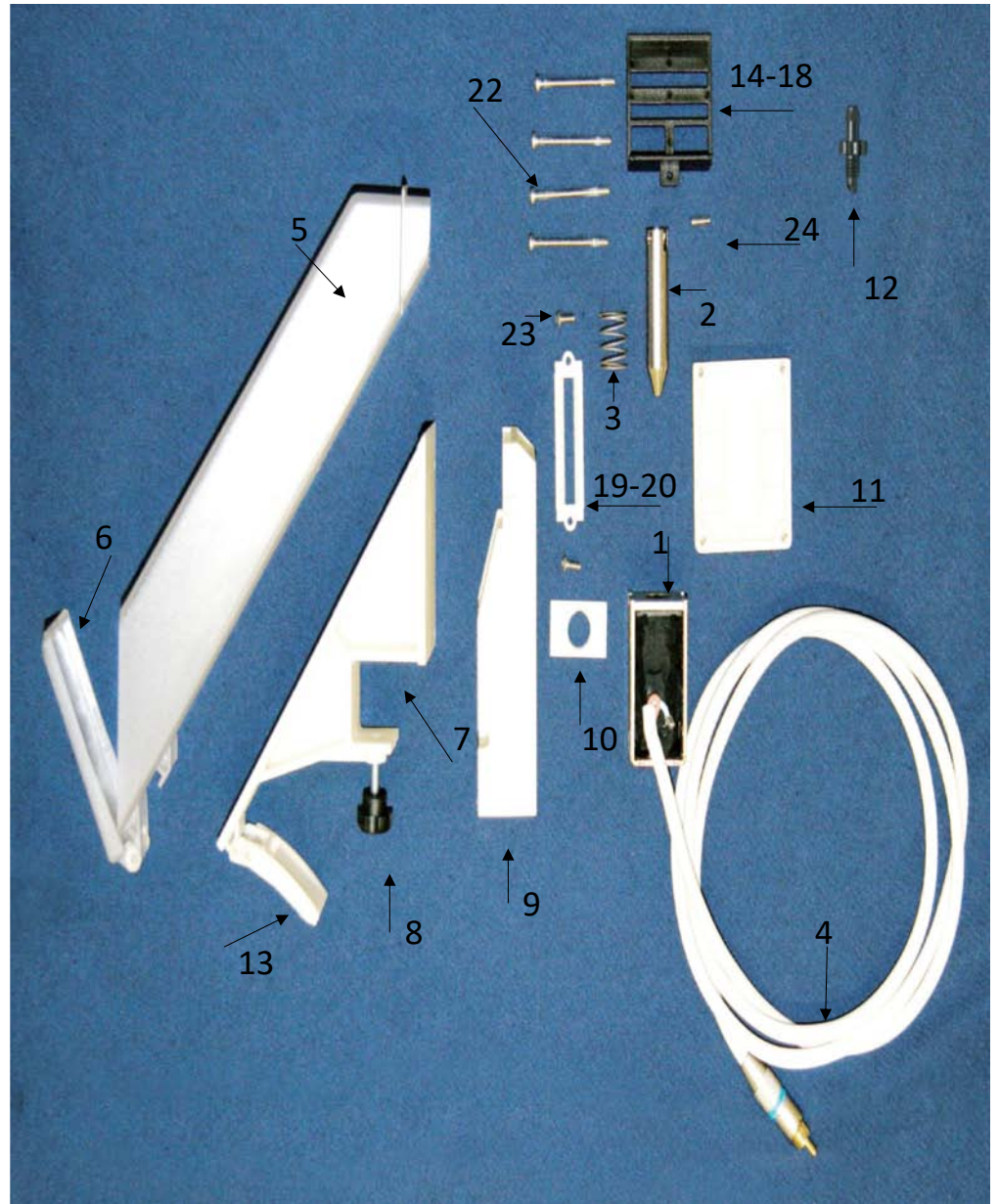
Varying dispense amounts	Low power to the feeders	<p>Ensure the feeder circuit is less than 1.5 Ohms.</p> <p>Ensure the connectors are clean.</p> <p>Ensure the connectors are completely pushed in.</p> <p>Check solder joints in connectors. (All feeders are checked before sending).</p> <p>Check for loose wires or dry solder joints causing intermittent faults.</p>	
Varying dispense amounts	Gap variation	<p>Ensure the base plate screws are not loose.</p> <p>Ensure the feeder plate is sitting parallel with the base plate.</p> <p>Ensure the feeder plate screw can freely move inside the solenoid piston attachment point.</p>	
Varying dispense amounts	Feeder bracket angle	<p>Ensure the feeder bracket is installed so that it holds the feeder level.</p>	<p>40 degrees up from horizontal is the optimal angle for the hopper. If this angle varies, by as little as 5 degrees, it will make a difference to the way the feed is resting on the plate and could result in a different delivery amount. Ideally feeders should be mounted on a bracket manufactured using 25mm square steel tube, so that they are securely resting over the tank.</p>
Varying dispense amounts	Condensation on feeder plates	<p>Ensure that the feeder is mounted > 300 mm above the water surface and away from aeration bubbles.</p> <p>Ensure the air manifold supply is dry air.</p>	<p>The feeders are generally located over water, which can cause condensation on the mechanism and therefore feed can build up on the plate. This may change the amount of diet that is dispensed. It is recommended that the feeder plates be cleaned daily with a soft brush, or compressed air.</p> <p>This will stop buildup of diet, particularly with very sticky and fine particulate diets.</p>

7. Specifications

Specifications	Controller	Feeder	Hopper
Voltage, Volts	100-240 AC	24 DC	
Power, Watts		50 (max)	
Cable	1mm, double insulated, 3-core flex	1mm, double insulated, 2-core flex	
Connections	3-pin plug, 10 AMP, 240 VAC, flat earth	Male, Gold Plated RCA connector	
Dimensions. Mm	320 x 400 x188	180 x 160 x 65	225 x 50 x 65
No of feeders	Up to 48		
Weight, grams	7,884	450	100
Capacity, grams			~250
Diet particle size, μm		50-1,500	
Materials	Polycarbonate with touch pad screen	Body – ABS Plates - Acetal	Acrylic

8. Part List

Part #	Description
1	Solenoid
2	Solenoid piston
3	Solenoid Spring
4	Cable with RCA Connector
5	Hopper
6	Hopper lid
7	Feeder Bracket
8	Bracket Screw
9	Feeder Body
10	Piston Cover
11	Air Manifold Feeder Base
12	Air Manifold Nipple
13	Hopper Clip
14	Feeder Plate 00
15	Feeder Plate 0
16	Feeder Plate 1
17	Feeder Plate 2
18	Feeder Plate 3
19	Base Plate (standard)
20	Base Plate (small to fit with feeder plate 00)
21	Body Screw (x4) (SS 304, M3 X 40 mm)
22	Base Plate screw (SS 304, M3 X 8 mm)
23	Feeder Plate Grub Screw (x1), (SS 304, M3 X 10 mm)



HATCHERY FEEDING SYSTEM

Model HFS-F

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