

## **Zebrafish system-Specifications:**

### **Tanks**

It should be “self-cleaning” tank. Using a baffle insert, the tank should facilitate incoming water flow to optimize the removal of debris and junk from tank

The tank assembly should have only three components (tank, lid, baffle insert). It should facilitate assembly, disassembly, and cleaning. Space efficiency is also considered with the storage and cleaning of the flat lid and baffle insert.

It should be of 1.5liter, 3liter and 5 liter in volume.

Tank lids/baffles are tinted blue/green to reduce lighting intensity and algae growth in the tank. Lids should feature feed holes and water inlet holes for water delivery tubing. Each lid should have a front tab for easy removal of lid from the tank. Lids should be flat with no recesses for easy cleaning and handling

Screen baffles should be in between 300-400, 500-750, and 900-1000-micron. They should be color coded for easy identification of screen size

Hand nets specifically designed to fit each tank size allow quick removal of fish

### **Racks**

Four double-sided rack system.

A spare rack for storage of empty tanks

All system support racks should be made of at least 316L grade tubular stainless steel or better.

Rack configurations should be with 6-shelf options

Racks should come standard with stainless steel leveling feet and extension leveling feet for significant floor grade changes

Stainless steel racks should be mat finish

A typical double rack, 6 shelf stand configuration should allow for (20) of 1.5-liter tanks per shelf, (12) of 3-liter tanks per shelf, or (6) of 10-liter tanks per shelf

Of the 6 shelves, bottom one shelf should be for 10 liter, middle 3 shelves for 3 liter and top two shelves for 1.5 liter tanks.

Racks should provide open shelving for best access to tanks, water supply valves, and drain gutters .

Gutters on each shelf should be easily removable for cleaning or replacement. Gutters should be able to protect from algae growth reduce algae growth with suitable coatings on the material. Fishes fallen by chance into the gutters should not escape to the outside.

Tank positions on rack should be such that it allows access to within the tank without removal of the tank

The flow control valve that should be able to adjust incoming water flow from a fine steady drip to a full stream of water providing up to 6-8 tank volume turnovers per hour

The different capacity tank's bottom should have mouldings to secure the tank in its proper position on the respective support rack, that prevent accidental dislocation of tank.

### **Circulation**

Should ensure optimal water quality conditions for the fishes.

2-3HP Pump Continuous-Duty Rated Motors with back up in case of failure.

It should have a fully adjustable water delivery and flow control at each tank, each row, and at each individual rack.

There should have a constant system pressure maintained by a pressure relief valve preventing variation of flow to tanks during water flow adjustment.

Standard flow rate provides up to 6-8 volume turnovers per hour per tank

The union ball valves on pump inlet and outlet should provide easy removal of pump for quick pump change capability.

There should have a spare pump plumbed for quick change-out is needed with the system.

### **Filtration**

Proper mechanical filtration should facilitate removing waste particulate matter early in the filtration process will increase the efficiency of the system's bio-filter as well as ensure that the UV sterilizer can work to its fullest potential to prevent the proliferation of microbial pathogens.

A 1<sup>st</sup> Stage 100-120-Micron Pre-Filter pad that can remove solids before they are broken down that protect from fouling of the biological filter.

A 2<sup>nd</sup> Stage Mechanical Filtration needed in the form of Bag Filters or some other new technology that capture solids down to 50-micron (finer micron bags are available).

### **Biological Filtration/Fluidized sand bed filters**

A Self-cleaning bio-filter, media kept in suspension via air injection allowing the easy exfoliation of older, pungent or less active bacteria layers.

- Biofilm surface area of 250-300 ft<sup>2</sup>/ft<sup>3</sup> surface area needed for optimal nitrification beyond maximum stocking densities.

Should maintain ammonia-nitrogen and nitrite-nitrogen levels less than 0.1 mg/L when mature.

- Should maintain nitrate-nitrogen levels less than 50 mg/L when 10% water exchange feature is in operation.

### **Chemical Filtration**

It should have a chemical filtration via activated carbon for the removal of dissolved organics and to ensure the highest possible level of water clarity prior to the filtration stage of UV disinfection.

Should have carbon filtration via media filter housing.

### **Ultraviolet Disinfection**

Minimum of 60,000  $\mu\text{W}\cdot\text{sec}/\text{cm}^2$  (at end of lamp life)

Low-pressure, High Intensity Lamps

Automated Shut-Off During Flow Stoppage

Temperature Overheat Protection

Lamp Status / Failure Indicator

Lamp Service Interval, 12 Months.

Back-up lamps of at least 4 number

### **Temperature Control**

Zebrafish applications typically require elevation of system water temperature to 28 degrees Celsius. High quality and reliable equipment with minimal maintenance requirements.

A heavy-duty, UL-listed Titanium Heating Element or similar.

Two level low water level shut-off protection

level 1: Level Sensor and System Controller Logic

level 2: Quick Resettable Protection Fuse

Heater with Hot Zone at Bottom of Sump

### **Aeration and Degassing**

Need air flow that is necessary for multiple duties that include keeping the bio-filter bed in constant suspension, adding oxygen to the system water, and stripping carbon dioxide from the system water.

Aeration should be via continuous-duty rated regenerative sweetwater brand Blower or better

High Efficiency, Cool Running Electric Motor

Automatic Thermal Overload Protection

Washable Air Inlet Filter

### **Reverse osmosis (RO) water system**

The system should have an RO water unit attached that has at least 50 liters per hour pumping capacity. This is for using in the tanks.

### **PH and Conductivity monitor**

The system should be equipped with automater pH and conductivity adjustments by making use of bicarbonate reservoir and fresh RO water supply

### **System Monitoring and Control**

Water quality monitoring, water quality dosing control, alarming, and data management into one user-friendly system.

Should be with safety features to protect system. An intuitive interface with the display touchscreen should let the user quickly program system settings, respond to alarms, access graphical displays, etc.

**Control of devices:**

- System Water Pumps
- Air Pump
- UV Sterilizers
- Heater or Chiller
- Water Exchange
- pH Dosing Pump
- Conductivity Dosing Pump

**Monitor the parameters including:**

- Temperature
- pH
- Conductivity
- Level
- Flow
- Total Dissolved Gas Pressure

**Alarm Capability**

- Audible & Visual Alarm
- Email & Text Alarm
- Dry Contacts for Analog Signal Device

**Display**

- Full Display Capability
- Chart up to 6 Parameters
- ~1,000 Data Point Memory

**Data logging**

- Water Quality Parameters
- Device Cycles
- Alarm Events
- Save and Email Data as Excel or .csv File

### **Password Protected Access**

- Options Menu Protected by 4-Digit Programmable Password
- Password Protection for Remote Operator Capability

### **Sensors**

- High quality sensor technology made to endure continuous long term use and wear
- Favor quick and easy installation and service
- Should be suited for precise and rapid application requirements
- The flow, pressure, and level sensors made of high grade stainless steel
- The connectors for easy removal and interchangeability
- Easy calibration for pH and that allows push-button calibration with led indicator for visual feedback
- Automated temperature compensation

### **Total Gas Pressure**

- Should continuously monitor total gas pressure
- Should provide instant shut-down of system pumps and alarm notification
- Easy to operate, maintain, and calibrate
- Accuracy of  $\pm 2$  mmHg/  $\pm 0.1^{\circ}\text{C}$

## **Source and Make-up Water**

- Should have linear medium density polyethylene graduated tanks or better with access covers
- Should have multiple storage tank volume sizes for any application
- Should have a flexible program timing for water change schedule
- Should have a pressure delivery of water change effluent allows for more flexibility to divert to drain locations
- Should have a pumped distribution of make-up water to fish system with low level shut-off of water distribution pump.

## **Breeding Tank Sets**

Set up your zebrafish crosses and collect embryos on or off the system using our 1-Liter and 2-Liter breeding tank kits.

2-liter polycarbonate breeding tank sets (tank, breeding insert, divider, and lid)  
breeding insert should fit within standard 3-liter and 10-liter tanks

1-liter polycarbonate breeding tank sets (tank, breeding insert, divider, and lid)  
breeding insert fits within standard 3-liter tanks

Two years comprehensive warranty to the entire system

### **2-Liter Breeding Tank Set-24 numbers**

### **1-Liter Breeding Tank Set-24 numbers**

**1.5 liter fish tanks with lids-350 numbers**

**3 liter fish tanks with lids-300 numbers**

**10 liter fish tanks with lids-50 numbers**

### **1.5 liter baffles**

**300-400 micron-200 numbers**

**500-750 microns-200 numbers**

**900-1000 microns-200 numbers**

### **3 liter baffles**

**300-400 micron-200 numbers**

**500-750 microns-200 numbers**

**900-1000 microns-200 numbers**

**10 liter baffles**

**300-400 micron-30 numbers**

**500-750 microns-30 numbers**

**900-1000 microns-60 numbers**

**Three years warranty with customer support.**