

## INVITATION TO BID

October 28, 2014

The Little Traverse Bay Bands of Odawa Indians, a federally Recognized Indian Tribe, invites your business to submit a Bid to design, fabricate, and furnish aquaculture equipment as specified in this Document.

Included with this letter are:

- 1.) Provisions governing this ITB.
- 2.) Technical project drawings
- 3.) Contact for Technical Questions only:  
Biologist: Doug Larson  
[DLarson@LTBBODAWA-NSN.GOV](mailto:DLarson@LTBBODAWA-NSN.GOV)

Thank you for your interest.

Sincerely,

Mandy Szocinski  
Accounting



## I. BIDS DUE

- A. All bids must be received by Mandy Szocinski in the Accounting Department by **November 20, 2014** no later than 2:00pm prevailing local time.
- B. Bids will be accepted in the following four methods:
  - 1. In person: Accounting Department, 7500 Odawa Circle, Harbor Springs, MI 49740
  - 2. By Fax: 231-242-1449
  - 3. By E-Mail: mszocinski@ltbbodawa-nsn.gov
  - 4. U.S. Mail to: Little Traverse Bay Bands of Odawa Indians  
Attn: Mandy Szocinski  
7500 Odawa Circle  
Harbor Springs, MI 49740
- C. Any questions regarding the bid process may be directed to Mandy Szocinski, at 231-242-1439.
- D. All bids will be reviewed at 7500 Odawa Circle, Harbor Springs, Michigan on **December 1, 2014**.

## II. REQUIREMENTS

- A. **Bidders are required to review project drawings and specifications prior to bidding Appendix A and B.**
- B. **Drawings are attached in this bid request "Appendix B".**
- C. **Design intent and equipment specifications listed in "Appendix A" of this bid.**
- D. **Additional specifications provided in Attachments "DOM-A-B" and "WQM-1" of this bid.**
- E. Design, fabricate, and furnish, shipping and unloading of equipment as specified to site location at LTBB Drier Road Fish Hatchery Project located at 4100 Giigoohns Miikaan Ave, Levering, MI 49755.
- F. **Technical Questions and / or Site Visit** Please direct technical or design questions to Hatchery Specialist Doug Larson at 231-373-0576 or [DLarson@LTBBODAWA-NSN.GOV](mailto:DLarson@LTBBODAWA-NSN.GOV). Should a bid require a site visit (at bidder's expense), please arrange through Doug Larson
- G. Must provide a shop drawing for each piece of equipment for approval of biologist and Owner prior to fabrication.
- H. Deliver to the site, LTBB Drier Road Fish Hatchery Project located at 4100 Giigoohns Miikaan Ave, Levering, MI 49755 for installation by building contractor (separate contract). **Project schedule: Delivery to "owner" by February 20, 2015.** Owner will inspect equipment for damages upon delivery.
- I. **Delivery:** Price to include packaging, handling and freight cost associated with delivery to site and offloading. Should offloading require additional crew members / equipment, these costs should be included in the bid. Must be delivered on pallet sufficient for pallet jack (handcart) accessibility.
- J. Damage during shipping should be repaired within 30 days at fabricator's expense.
- K. Arrange deliver to Hatchery address 4100 Giigoohns Miikaan Ave, Levering, MI 49755 with required plumbing for installation by LTBB.
- L. Equipment supplier is responsible for coordination with other equipment suppliers, LTBB and installation contractor.
- M. Provide an operation and maintenance manual in a three-ring binder for the Owner. Include the final approved shop drawing for each piece of equipment.
- M. Provide manufacturer's standard warranty on all equipment, minimum 2 years.

## III. QUALIFICATIONS OF CONTRACTOR,

- A. Must not appear as listed as parties that are excluded from receiving Federal contracts, certain subcontracts, and certain Federal financial and nonfinancial assistance and benefits, pursuant to the provisions of 31 U.S.C. 6101, note, E.O. 12549, E.O. 12689, 48 CFR 9.404, and each agency's codification of the Common Rule for Nonprocurement suspension and debarment.
- B. Please acknowledge, on your bid, that you have reviewed the specifications and drawings when preparing your bid. Failure to do so may disqualify bidder.
- C. A firm experienced in custom FRP vessel manufacture similar to that indicated for this project and with a record of successful in-service performance in similar applications. Minimum experience of at least 10 installations with an installed service record of 5 years or greater is required

## IV. PREFERENCES FOR CONTRACTOR

- A. Native American Preference shall apply.
  - 1. Citizens of the Little Traverse Bay Bands of Odawa Indians,
  - 2. Citizens of Other Federally Recognized Tribes, as certified by the Bureau of Indian Affairs



B. Special consideration shall also be given to firms proven to be minority owned and/or classified as small business, see item 4 of "Bid Package" submittal for documentation needed.

## V. INSURANCE REQUIREMENTS

The Contractor must meet and agree to maintain during the term of the Contract, the following insurance coverage, as required by law. All coverage shall be with insurance companies licensed and admitted to do business in the State of Michigan.

- A. The Contractor shall carry Worker's Compensation and Employer's Liability Insurance Coverage.
- B. The Contractor shall be responsible for insuring all its vehicles, equipment, tools and all materials which it may use at the work site during contract period. LTBB shall not be responsible for any loss or damage to the Contractor's vehicles, equipment, tools and materials.
- C. The Contractor shall procure and maintain during the term of the contract Commercial General Liability Insurance on an "occurrence basis" with limits of liability of not less than \$1,000,000 per occurrence combined single limit, for Personal injury, Bodily injury and Property Damage. Coverage shall include the following extensions: 1.) Contractual Liability; 2.) Products and Completed Operations Coverage; 3.) Independent Contractors Coverage; and 4.) Broad Form General Liability Extensions or equivalent.
- D. The Contractor shall maintain Vehicle Liability Coverage and Michigan No-Fault coverage including all owned, non-owned, and hired vehicles, of not less than \$1,000,000 per occurrence combined single limit.
- E. If any of the above coverage expires during the term of the contract, the Contractor's insurer shall deliver renewal certification and/or policies to: Little Traverse Bay Bands of Odawa Indians, Accounting Contracts Personnel, and 7500 Odawa Circle, Harbor Springs, Michigan 49740.

## VI. CONTRACT AWARD

The LTBB Contracts Personnel, the LTBB Biologist and the LTBB Natural Resources Director will evaluate the bids and make a decision to award the contract to one or more responsive, responsible bidder(s) having proven experience in Aquaculture equipment as described in Appendixes A and B and requirements in Section II of this invitation to bid. Native American Preference shall apply.

The award may be split, at the LTBB's discretion, between two (2) or more contractors to better service specific locations. LTBB may make a determination that the rejection of all bids is in the best interest of LTBB. LTBB will not pay for any information herein requested, nor is it liable for any costs incurred by the bidder.

## BID PACKAGE

Contractors must submit a response in the form of a bid that includes the following sections:

Contractors must submit a response in the form of a bid that includes the following sections:

- A. TRANSMITTAL LETTER – This letter is to be a brief letter, addressed to Mandy Szocinski,
  1. Name, address, telephone number, and email of the contact person including the signature, typed name and title of the individual who is authorized to commit the contractor to the proposal the bid.
- B. BID
  1. Introduction
    - a. Company Profile including the date organized to provide services.
    - b. List of References.
    - c. Bidder Acknowledgement: Indicate that you have reviewed the specifications and drawings when preparing your bid
  2. The price of each piece of equipment and the total fixed all inclusive cost of the equipment for the Contract term as noted in Section II of this invitation.
  3. Provide a shop drawing for each piece of equipment for approval of biologist and Owner
  4. Documentation Required for Preferences Listed in Section IV—All things being equal, the following types of firms would receive special consideration, in the award of this contract:
    - Indian Owned— Indian owned is defined as, at least 51% Indian owned & controlled by person(s) of certified (federally recognized) Native American heritage; SBA or Tribal certification required.
    - Minority Owned— Minority owned is a firm that is at least 51% owned and controlled by a minority and so documented; SBA 8-a certification required.
    - Small Business— Small business for this purpose is firm doing less than \$2 million annually as verified by gross receipts, SBA certification required
  5. A copy of the Certificates of Insurance for the Contract term as noted in Section V of this invitation.

## Appendix A

Design Intent: The main area of the hatchery building which will be utilized for primary fish production consists of an open area which is serviced with an overhead cold and heated water piping trapeze and in-floor trench drains capable of easily providing a variety of setups for cool and cold water fish species rearing. Pumped well water is fed into the insulated, overhead piping trapeze from the Coldwater Headtank and Coldwater Degassing Columns (CWHT-1, CWVD-1) or Heated Water Headtank and Heated Water Vacuum Degassing Column (HWHT-1, HWVD-1) which is located on the mezzanine. Equipment will be installed after the building, water, and electrical infrastructure is in place. Placement of equipment in proper location per diagrams and confirmation via qualified hatchery personal is critical. This bid will be to provide the owner with eight circular aquaculture tanks capable of hookup to a future recirculating aquaculture system, OR hookup to the existing overhead flow through system. See specific specifications required below.

### Description of Future Recirculating Aquaculture System (RAS)

Once large enough, fingerlings are placed into the Recirculating Aquaculture System (RAS) 8' dual drain fiberglass tanks for final grow-out. This system is set up to operate in several modes:

- Full Recirculation Mode with less than 5% makeup water daily
- Partial Recirculation Mode with 5-10% makeup water daily (Recommended)
- Full Flow-Through Mode with no recirculation
- The RAS system is made up of different components all acting together to effectively reduce the toxic buildup of metabolites such as ammonia, nitrite, TAN, and related items from a high concentration of fish while reconditioning the water for reuse by the fish.

The main components of the example system include:

- TNK-A1-A4, B1-B4. Cornell style dual drain fiberglass rearing tanks
  - MSDF-1. Drum Filter for removal of sediments in the water
  - SUMP-1. Fiberglass sump serving as a collection point for pumping and distributing recirculated system water
  - BIOF-1. Fiberglass biofilter removing toxic metabolites
  - GMT-1A-1B. Fiberglass Degassing/Aeration/LHO Chamber for degassing and aerating RAS system water after the biofiltration system.
  - UVS-1. UV Sterilizer for sterilization of system water.
  - PMP-1A-1B. Recirculation pumps for moving system water throughout the RAS system
  - HTX-A-B. Chiller/Heat Exchanger unit to cool water during summer months (designed by manufacturer)
  - LOXT. Oxygen Injection for LHO and Emergency Backup.
  - The entire Coldwater Rearing Area is serviced with an overhead water trapeze supplying fresh, cold (48 degree), degassed, aerated water from the main headtank (CWHT-1). Supply line for the recirculated water which is pumped from the RAS sump to the 8' fiberglass tanks will run in the trench drains.
  - Drainage is accomplished utilizing trench drain systems with fiberglass grating and standard PVC piping.
  - This system will lend itself to a variety of configurations for running recirculation or flow through water to the tanks.
- **PLEASE NOTE: Bid may be submitted for all equipment, or for individual alternate sections. Alternates will include the following equipment.**
- **Alternate A; Fiberglass:**
    - Biofilter Vessel
    - Gas Management Tower
    - Fiberglass Sump
  - **Alternate B; Drum Filter and Control Panel**
    - Micro-screen Drum Filter
    - Drum Filter Booster Pump
    - Drum Filter Control Panel
  - **Alternate C; Monitoring Equipment**
    - Water Quality Monitoring Equipment
    - Dissolved Oxygen Monitoring Equipment
    - Temperature Control Panel
  - **Alternate D; Recirculation Pumping System**
    - Two Recirculation Pumps
    - Recirculation Pump Control Panel



**PLEASE NOTE: Fish Hatchery/Aquaculture Equipment Schedule**

Fish Hatchery/Aquaculture Equipment Schedule

ID	No. Req.	Item	Size	location	description	Manufacturer	Remarks	DESIGN FLOW (GPM)	MAX FLOW (GPM)
<b>Coldwater RAS system</b>									
MSCF-1	1	Micro-Screen Drum Filter	48" L X 36" W X 36" H	Coldwater RAS Area	Drum Filter	Aquatic Habitats	Floor Mount. Effluent water in from 8 RAS tanks. Two pipe outlets feed to RAS Sump and concentrated sediment fishwaste line (going out of building).	400	400
BSTP-1	1	Booster pump for drum filter		Coldwater RAS Area	Drum Filter	Aquatic Habitats		15	15
GMT-1A-1B	2	Gas Management Tower w/LHO	30" dia x 18' height	Coldwater RAS Area	Cylindrical Fiberglass Degassing System	Aquatic Habitats	Floor Mount. Connects to Biofilter via piping. Gravity water flow feeds to TNK A1-A4 and B1-B4, respectively. Inlet for oxygen connection.	400	400
BIOF-1	1	Biofilter Vessel	60" dia x 18' height	Coldwater RAS Area	Fiberglass Cyclonic BioReactor/Biofilter	Aquatic Habitats	Floor Mount. Water flow from inground sump via pump. Feeds to Degassing Column via gravity through piping.	400	400
SUMP-1	1	Pump Sump Tank	9' L X 6' W X 5'	Coldwater RAS Area	In Floor Concrete Pump Sump	Local Contractor	In Floor Custom pump sump area for fiberglass sump. 4 feet below FFE. Gravity water flow in from drum filter pumped water flow out to biofilter. Needs overflow capability to trench drain.	400	400
PMP-1A-1B	2	Recirculation Pumps		Coldwater RAS Area	sump pumps 1/60/230-460 V	Aquatic Habitats	Pump stand on floor located near sump pit. Pumps water from sump pit to biofilter.	400	400
CP-101	1	Pump control panel	36" x 36" x 10"	Coldwater RAS Area	motor control and alarm system for RAS	Aquatic Habitats	Located near system equipment. Ties in facility SCADA system.	NA	NA
CP-301	1	Drum Filter Control panel	24" x 24" x 8"	Coldwater RAS Area	motor control and alarm system for RAS	Aquatic Habitats	Located near system equipment. Ties in facility SCADA system.	NA	NA
CP-401	1	Temperature control panel	36 x 36" x 10"	Coldwater RAS Area	motor control and alarm system for RAS	Aquatic Habitats	Located near system equipment. Ties in facility SCADA system.	NA	NA
WQM-1	1	Water Quality Monitor	12" x 10" X 5"	Coldwater RAS Area	YSI 5200-A Monitoring System	Aquatic Habitats	Located near system equipment. Ties in facility SCADA system.	NA	NA
DOM-A-B	2	Dissolved Oxygen Monitors	12" x 10" X 5"	Coldwater RAS Area	YSI 5400-A Monitoring Systems	Aquatic Habitats	Located near system equipment. Ties in facility SCADA system.	NA	NA

Specification of Tanks Required for this Bid Contract

**ALTERNATE A:**

**GMT-1A-1B (Gas Management Tower w/LHO)**

**Quantity: 2**

**PART 1 – GENERAL**

**1.1 RELATED DOCUMENTS**

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

This Section includes the GMT for the Coldwater RAS Treatment System. The total number of GMT specified in this section is 2.

**1.3 DEFINITIONS**

A. The following are industry abbreviations:

1. FRP: Fiber reinforced plastic
2. gpm: Gallons per minute

**1.4 MATERIAL RESTRICTIONS**

A. The Contractor shall not install any material containing cadmium, brass, bronze, copper, zinc, or their alloys, which could come in contact with fish rearing water. These heavy metal materials have been shown to be toxic to fish.

B. All pumps, valves, piping, wetted components, etc. that may come in contact with water shall be a material specified and approved by the Contracting Officer or the Contracting Officers Technical Representative (COTR).

## PART 2 - PRODUCTS

### 2.1 GMT

A. The GMT shall be custom FRP vessels manufactured according to the specifications in this section and as detailed in the drawing set, and according to the specifications for FRP vessels in Basic Materials and Methods for FRP Vessels.

1. The GMT shall be engineered by the Manufacturer to account for fluid service and loading conditions described in this section and in the drawing set.

### Gas Management Tower -GMT

#### 1. Identification

- a) Equipment Name – Gas Management Tower
- b) Equipment Number – GMT1A-1B
- c) Quantity – 2

#### 2. Operating Conditions: The GMT shall be suitable for long-term operation under the following conditions:

- a) Duty – Continuous
- b) Fluid service – Fresh, Brackish, or Salt Water– 0–36 ppt Salinity
- c) Fluid temperature (degrees C)7.6 to 15 (48 to 60°F)

#### 3. Dimensions: See the drawing set for detail dimensions, flange sizes and orientation, and other required accessory dimensions.

#### 4. Description of Operation:

- a) In normal operation the GMT shall receive 757-1,514 L/min (200-400 gpm) of process water from the Biofilter.
- b) Process water flows through the vessel, LHOand out into the tank piping system
- c) GMT will be sized to adequately meet or exceed the following water quality parameters based on facility production estimates of 5,000 pounds of coldwater fish at water temperatures 48-60 degrees F.

## CYCLONIC FLUIDIZED SAND FILTERS

### PART 1 – GENERAL

#### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes the CYCLONIC Fluidized Sand Filter for the Coldwater RAS Treatment System.
- a. The total number of Fluidized Sand Filters specified in this section is 1.
  - b. This bid does NOT include sand filter media.

#### 1.3 DEFINITIONS

A. The following are industry abbreviations:

1. FRP: Fiber reinforced plastic
2. gpm: Gallons per minute

## PART 2 – PRODUCTS

### 2.1 CYCLONIC FLUIDIZED SAND FILTERS

The Cyclonic Fluidized Sand Filters shall be custom FRP vessels manufactured according to the specifications in this section and as detailed in the drawing set, and according to the specifications for FRP vessels in Basic Materials and Methods for FRP Vessels.

1. The Fluidized Sand Filters shall be engineered by the Manufacturer to account for fluid service and loading conditions described in this section and in the drawing set.
2. The Fluidized Sand Filters shall each have a 304.8 mm (12 inch) wide effluent launder at the top with a 360 degree V-notch weir.
3. The Fluidized Sand Filters shall each have a 609.6-mm (24-inch) diameter 68.04 kg (150 lb) flanged port manway for access into the vessel, as specified in the drawings.
4. The Fluidized Sand Filters shall each have a 50.8 mm (2 inch) diameter floc siphon port.
5. The Fluidized Sand Filters shall each have a 152.4 mm (6 inch) or 203.2 mm (8 inch) diameter inspection port with ANSI flange.
6. The Fluidized Sand Filters shall each be supplied with ample hold down flanges that the manufacturer has determined sufficient for securing the vessel to the concrete floor according to the seismic requirements of the location.

## B. CYCLONIC FLUIDIZED SAND FILTER (BIOF)

### 1. Identification

- a) Equipment Name – Cyclonic Fluidized Sand Filter
- b) Equipment Number – BIOF
- c) Quantity – 1

### 2. Operating Conditions: The Fluidized Sand Filter shall be suitable for long term operation under the following conditions:

- a) Duty – Continuous
- b) Fluid service – Fresh, Brackish, or Salt Water– 0–36 ppt Salinity
- c) Fluid temperature (degrees C)7.6 to 15 (48 to 60°F)

### 3. Fluidized Sand Filter Dimensions: See the drawing set for detail dimensions, flange sizes and orientation, and other required accessory dimensions.

### 4. Description of Operation:

- a) In normal operation the Fluidized Sand Filter shall receive 757- 1,514 L/min (200-400 gpm) of process water from its reuse system pump sump. The process water enters the Fluidized Sand Filter tangentially through the inlet at the base of the vessel, passes through the annular space and inlet slot about the inside perimeter of the vessel, and flows upward through the void spaces of the expanded fluidized sand bed biofilter media.
- b) Process water flows upward through the vessel and out through a V-notch weir at the top to the effluent launder where it then exits the Fluidized Sand filter through a outlet pipe . The outlet pipe connects to the flange of the CO2 Stripper/LHO unit(GMT).
- c) Bacteria grow on the expanded sand in each Fluidized Sand Filter; these bacteria remove dissolved wastes (i.e., ammonia, nitrite, and organic carbon) from the reuse process water. As the bacteria grow, excess biosolids flocs are controlled within the filter as needed by siphoning the biofilm from the top of the fluidized sand bed. A 76.2 mm (3 inch) PVC ball valve installed on the pipe draining the biosolid floc siphon port will be used to direct the waste solids into a flexible hose whose outlet can be manually placed above a floor drain when siphoning is necessary.
- d) Fluidized sand filter will be sized to adequately meet or exceed the following water quality parameters based on facility production estimates of 5,000 pounds of coldwater fish at water temperatures 48-60 degrees F.

1. Ph: 7.5
2. Oxygen: > 7.0ppm
3. Alkalinity: 100-400
4. Ammonia: <2.0ppm
5. Nitrite:<0.3ppm
6. Unionized ammonia(calc): 0.0125ppm
7. Nitrate: <100ppm

### Product ID: SUMP-1

Quantity: 1

Product Description: Custom Manufactured Pump Sump Tank Insert

### GENERAL INFORMATION:

Material Fiber	Reinforced Plastic (FRP)
Approx. Size	Length 108" x Width 72"
Approx wall height	72"
Insulation	Tank requires 1.5" of insulation on sides. Insulation to be encapsulated in FRP. Finish Fiberglass gel coat -Internal-dark green -External -white
Floor pitch	Tank floor is not sloped. Tank rests on floor inside existing concrete sump pit. Verify size of sump pit for exact tank size.
Pump fittings	Coordinate 2 distribution pump tank wall fittings (4" socket X socket PVC coupling) with RAS system and pump suppliers and installers.
Overflow Drain fitting	Coordinate overflow drain tank wall fittings (6" socket x socket PVC coupling) with RAS system suppliers and installers into existing drain system (WS-2).
Drum Filter fitting	Coordinate drum filter water inflow wall fittings if needed with RAS system, drum filter suppliers and installers

## QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in custom FRP vessel manufacture similar to that indicated for this project and with a record of successful in-service performance in similar applications. Minimum experience of at least 10 installations with an installed service record of 5 years or greater is required.
- B. Installer Qualifications: Engage personnel experienced in FRP vessel installations similar to that required by this project who are acceptable to the FRP vessel manufacturers.
- C. Provide listing/approval stamp, label, or other marking on the equipment indicating that they are made to specified standards.

## MATERIAL RESTRICTIONS

- A. The Contractor shall not install any material containing cadmium, brass, bronze, copper, zinc, or their alloys, which could come in contact with fish rearing water. These heavy metal materials have been shown to be toxic to fish.
- B. All pumps, valves, piping, wetted components, etc. that may come in contact with water shall be a material specified and approved by the Buyer or appointed representative.

## PRODUCTS

### Pump Sump

- A. The Pump Sump shall be custom FRP vessel manufactured according to the specifications in this section and coordination with RAS system Provider and Design Team. Drawings will be provided by approved vendor according to the specifications outlined.
- B. The Pump Sump shall be engineered by the Manufacturer to account for fluid service and loading conditions described in this section and in the drawing set for the Coldwater RAS system.

## ALTERNATE B

**Product ID: MSDF-1; BSTP-1; CP-301**

**Quantity: 1**

**Product Description: MircoScreen Drum Filter, Control Panel and Booster Pump**

### General Information:

Tanks Material	High Density Polyethylene or approved equal
Internal wetted parts	316 SS
Screen size	40 Micron
Process water flow rate	400 GPM
Assumed TSS	25 mg/liter
Backwash water source	(1) filtered process water (2) Cold water header Tank
Booster assisted backwash	Yes (80-100 PSI)
Solenoid valve	Yes
Emergency shut off	Yes, on MSDF, and controller.
Controller	Vendor integrated controller -Powers all associated hardware -Provides output alarms
Controller	208 Single-phase power input with neutral pulled for 120Volt. - Drum Motor (208-230/ 3ph) - Booster Pump(208-230/3ph) - Solenoid (115 volt)

### **Approved manufacturers:**

Faever Inc. and Hydrotech

## ALTERNATE C

**Product ID: WQM-1**

**Quantity: 1**

**Product Description: YSI 5200A Continuous Multi-parameter RAS Monitor**

## PART I – GENERAL

### I.1 RELATED DOCUMENTS

The YSI 5200A Continuous Multi-parameter RAS Monitor is detailed in the drawing set, and should be provided with all necessary consumables needed for start-up operation.



**Product ID: DOM-A-B**

**Quantity: 2**

**Product Description: YSI 5400A Continuous Multi-parameter RAS Monitor**

**1.1 RELATED DOCUMENTS**

The YSI 5400A Continuous Multi-parameter RAS Monitor is detailed in the drawing set, and should be provided with all necessary consumables needed for start-up operation.

**Product ID: CP-401**

**Quantity: 1**

**Product Description: Temperature Control Panel**

**1.1 RELATED DOCUMENTS**

A. See equipment Schedule; Should communicate with YSI 5200A and should be provided with all necessary consumables needed for start-up operation.

**ALTERNATE D**

**Product ID: PMP1A-1B; CP-101**

**Quantity: 2**

**Product Description: RAS Distribution Pumps and Control Panel**

**General Information:**

Style	Flooded suction, metal housing
Impeller	Stainless or approved equal
Make	Goulds or approved equal
Power	Single-phase
Size	Calculated based on system design and pump style
Process water flow rate	200 gpm
Low level alarms and shut off	Yes, on pumps, and controller.
Controller	Vendor integrated controller with panel -Powers all associated hardware -Provides output alarms (4-20mv signal)

RAS Distribution pumps mounted on floor near fiberglass sump insert responsible for pumping water from the sump to the bio-filtration unit and gas management towers. Supplier/Vendor is responsible for calculating/selecting proper pump size for a complete working system with normal operation of 400gpm of recycle water. Vendor is responsible for utilizing available drawings and equipment specs to select correct pumps.







## SPECIFICATIONS

DOCUMENT #W46-02



## Parameters:

Dissolved Oxygen (Galvanic; electrochemical)  
 Temperature  
 Additional User-Configurable Inputs

## Applications:

Recirculating Systems  
 Raceways  
 Ponds  
 Sea Cages  
 Live Haul  
 Aquariums  
 Research  
 Tanks

## YSI 5400

## Continuous MultiDO Monitoring and Control

Designed specifically for aquaculture systems, the YSI 5400 Continuous Monitor for dissolved oxygen along with AquaManager® Software can be used to integrate process control, feeding, alarming and data management into one product for a complete facility or can be used to simply monitor one tank. Powerful enough to manage a full-scale farming operation from anywhere in the world yet simple enough for anyone to use.

- MultiDO monitor
- Ethernet TCP/IP or wireless communications - optional
- Event logging records calibrations, high and low conditions, and more
- Conditional feed timer with Feed Smart™ software included
- Networking capability up to 32 instruments per communications port or can be integrated with 5200A multiparameter monitors or 5500 optical DO monitors
- Graphic interface function for quick, reliable system status checks
- Plug-and-play...easy to install, setup and maintain; no need to hire consultants
- Flexible monitoring and control software
- E-mail and SMS alarming

The standard conditional feed timer, **Feed Smart™**, manages food delivery based on user's preset criteria. Manage feed delivery based on user-selectable inputs for the number of daily feedings, daily feed weights, total biomass and feed conversion ratios (FCRs), along with parameter control based on water quality values. Interfaces with most auto feeders.



A 5400 deployed pond-side to control paddle wheels

Optional **AquaManager®** desktop software allows you to view, configure, or setup instruments from the convenience of one central location. Instantly see an overview of your facility, manage parameter set points, and conveniently manage data to make informed operational decisions. Browser-based format makes navigation, setup and maintenance easy and the facility mapping feature provides an immediate overview of all ponds or tanks indicating their current state.

[YSI.com/5400](http://YSI.com/5400)

## 5400 Controller Specifications

<b>Dissolved Oxygen (Galvanic)</b>	Range	0 to 500% air saturation; 0 to 60 mg/L
	Resolution	0.1% (0.0-99.9%); 0.01 mg/L (0-10 mg/L); 0.1 mg/L (10-60 mg/L)
	Accuracy	±2% or ±0.2 mg/L whichever is greater (0-200%)(0-20 mg/L), ±6% of reading (200-500%)(20-60 mg/L)
	Response time	95% of reading in 17 seconds for 2.0 mil PE membrane; 95% of reading in 36 seconds for 2.0 mil Teflon® membrane
<b>Temperature</b>	Range	0 to 45 °C (32 to 113 °F)
	Resolution	0.1 °C
	Accuracy	± 0.2 °C
<b>Timers</b>	4 timers - 10 events cascading events start/duration 4 feed timers (feeder not supplied); Feed Smart™ software manages feed delivery, user-selectable inputs for number of daily feedings, daily feed weights, total biomass, FCRs and parameter control	
<b>Communication Ports</b>	RS485 and RS232 standard; Ethernet and wireless optional	
<b>Memory/Logging</b>	Non-volatile; 1000 data, 1250 relay/alarm, 1000 entries/change and 500 GLP records	
<b>Warranty</b>	2-years instrument; 1-year probes and cable	
<b>Inputs</b>	4 DO probe inputs	
	4 user-configurable inputs for temp (0 to 1.0 VDC, 0 to 5.0 VDC or 4-20 mA) or DO, pH, TGP, ORP, photo period, etc.	
	2 user-configurable inputs, digital (0 to 1.0 VDC, 0 to 5.0 VDC or 4-20 mA)	
<b>Ratings</b>	NEMA 4X, CE, ULC, CUL, ETL, RoHS, IP-65, Made in USA	
<b>Instrument Operating Range</b>	-15 to 70°C (5 to 158 °F) Direct exposure to outside conditions NEMA 4X Enclosure	
<b>Output Relays</b>	8 each 10 amp 115 VAC (5 amp 230 VAC) relays for parameter, control and/or alarm E-mail and/or SMS alarming up to 3 e-mails with Ethernet module or up to 10 e-mails with AquaManager	
<b>Power Requirements</b>	Option 1	12 VDC; mobile live haul or anytime AC power not available
	Option 2	100-240 VAC; automatically switches to 12 VDC back-up with alarm if primary voltage drops
<b>Display</b>	Back-lit graphic LCD (320 x 240) with timer, extended temperature range LCD	
<b>Operating System</b>	AquaManager Software: Windows 2000/XP/Vista/Windows 7 operating systems	
<b>Field Upgradable Software</b>	Yes; flash based	
<b>Size</b>	Height: 16.5 cm (6.5 in)	
	Length: 21.6 cm (8.5 in)	
	Depth: 12.1 cm (4.75 in)	

## 5400 Ordering Information (controllers, cables, accessories separately)

5400-DC	MultiDO monitor, 12 VDC, includes wall mount, no power supply
5400-AC	MultiDO monitor, 100-240 VAC, includes wall mount and 115 VAC
605952-X	4- 10- 20- 30- 50- or 60-m cable with galvanic DO/temp (special order up to 100-m)
605953-X	4- 10- 20- 30- or 50-m cable with galvanic DO (special order up to 100-m)
5405-5	DO membrane kit, 2 mil Teflon, 5 membranes, electrolyte
5405-25	DO membrane kit, 2 mil Teflon, 25 membranes, electrolyte
5406	1 pint (473 mL), DO electrolyte
6505	Weather shield
6509	Rail mount kit
6510	Panel mount kit
5209A	AquaManager desktop software
5578	12 V power supply, 230 VAC for 5400-AC
5579	12 V power supply, 115 VAC for 5400-DC

### YSI

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YSI is a registered trademark.  
 Specifications are subject to change. Please visit YSI.com to verify all specs.  
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## SPECIFICATIONS

DOCUMENT #W45-01

**YSI 5200A Multiparameter Monitor & Control****Continuous Water Quality, Feeding, and Process Control**

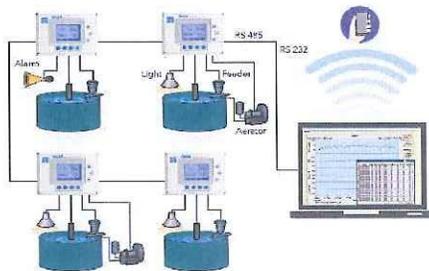
Engineered specifically for tank-based systems, the YSI 5200A Continuous Monitor and AquaManager® Software can be used to integrate process control, feeding, alarming and data management into one product or can be used to simply monitor one tank. Powerful enough to manage a full-scale farming operation from anywhere in the world yet simple enough for anyone to use.

**Parameters:**

Dissolved Oxygen (electrochemical)  
pH  
ORP/Redox  
Conductivity  
Specific Conductance  
Salinity  
Total Dissolved Solids (TDS)  
Temperature

**Applications:**

- Recirculating systems
- Raceways
- Ponds
- Sea cages
- Live haul
- Aquariums
- Research
- Tanks



Example of four 5200A's monitoring individual tanks with direct PC connection.



- Multiparameter: DO, Temperature, Conductivity, pH, ORP, Salinity
- Ethernet TCP/IP or wireless communications - optional
- Event logging records calibrations, high and low conditions, etc
- Conditional feed timer with Feed Smart™ software included
- Networking capability up to 32 instruments per communications port or can be integrated with 5400 (galvanic) and/or 5500D (optical) MultiDO monitors
- Graphic interface function for quick, reliable system status checks
- Plug-and-play...easy to install, setup and maintain; no need to hire consultants
- Flexible dosing and control software
- E-mail and SMS alarming
- AquaViewer app available for easy access to view data at any time



The standard conditional feed timer, Feed Smart™, manages food delivery based on user's preset criteria. Manage feed delivery based on user-selectable inputs for the number of daily feedings, daily feed weights, total biomass and feed conversion ratios (FCRs), along with parameter control based on water quality values. Interfaces with most auto feeders.

Optional AquaManager® desktop software allows you to view, configure, or setup instruments from the convenience of one central location. Instantly see an overview of your facility, manage parameter set points, and conveniently manage data to make informed operational decisions. The facility mapping feature provides an immediate overview of all ponds or tanks indicating their current state.

YSI.com/5200A-

## YSI 5200A System Specifications

Dissolved Oxygen (polarographic)	Range	0 to 500% air saturation; 0 to 60 mg/L
	Resolution	0.1% air saturation (0.0-99.9%); 0.01 mg/L (0-10 mg/L); 0.1 mg/L (10-60 mg/L)
	Accuracy	±2% or ±0.2 mg/L whichever is greater (0-200%)(0-20 mg/L), ±6% of reading (200-500%)(20-60 mg/L)
	Response time	95% = 17 seconds for 2.0 mil PE membrane; 95% = 36 seconds for 2.0 mil Polytetrafluoroethylene membrane
Conductivity	Range	0-200 µS, 0-2000 µS, 0-20 mS, 0-200 mS
	Resolution	0.1 µS (0-200 µS range); 1 µS (0-2000 µS range); 0.01 mS (0-20 mS range); 0.1 mS (0-200 mS range)
	Accuracy	±0.5% of range (0-100 mS); ±1.0% of reading (100-200 mS)
ORP	Range	-2000 mV to +2000 mV
	Resolution	1 mV
	Accuracy	±20 mV
pH	Range	0.0 to 14.0 pH
	Resolution	0.01 pH
	Accuracy	±0.2 pH
Salinity (calculated)	Range	0 to 80 ppt (0 to 50 ppt when entered manually)
	Resolution	0.1 ppt
	Accuracy	±2% or ±0.1 ppt
Temperature	Range	0 to 45°C (32 to 113°F)
	Resolution	0.1°C
	Accuracy	±0.2°C
Timers	4 timers - 10 events cascading events start/duration 1 feed timer (feeder not supplied); Feed Smart™ software manages feed delivery, user-selectable inputs for number of daily feedings, daily feed weights, total biomass, FCRs and parameter control	
Communication Ports	RS485 and RS232 standard; Ethernet and wireless optional	
Memory/Logging	Non-volatile; 2000 data, 1250 relay/alarm, 1000 entries/change and 500 GLP records	
Warranty	2-years instrument; 1-year cable and probes	
Inputs	2 user-configurable inputs, (digital 0 to 1.0 VDC, 0 to 5.0 VDC or 4-20 mA, selectable) DO, pH, TGP, ORP, etc.*	
Ratings	NEMA 4X, CE, ULC, CUL, ETL, RoHS, IP-65, Made in USA, lightning protection	
Instrument Operating Range	-15 to 70°C (5 to 158°F) Direct exposure to outside conditions NEMA 4X Enclosure	
Output Relays	4 internal 10 amp 115 VAC (5 amp 230 VAC) relays for parameter, control and/or alarm (not fused) E-mail and/or SMS alarming up to 3 e-mails with Ethernet module or up to 10 e-mails with AquaManager	
Power Requirements	Option 1	12 VDC; mobile live haul or anytime AC power not available
	Option 2	100-240 VAC; automatically switches to 12 VDC back-up with alarm if primary voltage drops
Display	Back-lit graphic LCD (320 x 240) with timer, extended temperature range LCD with backlight	
Operating System	AquaManager Software: Windows XP SP3/Vista/Windows 7 operating systems (32/64 bit)	
Field Upgradable Software	Yes; flash based	
Size	Height: 16.5"cm (6.5 in); Length: 21.6 cm (8.5 in); Depth: 12.1 cm (4.75 in)	

## YSI 5200A Ordering Information (order items separately) additional items available at [YSI.com/5200A](http://YSI.com/5200A)

5200A-AC	Multiparameter monitor, 110-240 VAC
5200A-DC	Multiparameter monitor, 12 VDC, power supply not included
5561-X	4- 10- 20- or 30-meter cable with polarographic DO/temp
5562-X	4- 10- or 20-meter cable with polarographic DO/temp/conductivity/pH (order 5564 or 5565 separately)
5564	pH Sensor Kit (calibration solutions not included)
5565	pH/ORP Sensor Kit (calibration solutions not included)
5209A	AquaManager desktop software
6505	Weather Shield
6509	Rail Mount Kit
6510	Panel Mount Kit
5402	Serial to Ethernet Cable

\* A transmitter may be required.

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