



# Aquaculture

CONTINUOUS MONITORING AND CONTROL



a xylem brand



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Thank you for considering YSI as your supplier of water quality monitoring and control instrumentation. As the demand for high quality aquaculture production increases and aquatic life support management becomes more automated, the need for water quality monitoring instrumentation to ensure a healthy harvest is also increasing.

YSI, the manufacturer of handheld instruments you've used and trusted for years, is here to help. We have expanded our continuous water quality monitoring and control instrumentation product line and have designed it specifically for the aquaculture and aquatic life professional.

We pride ourselves in developing and manufacturing industry-leading instrumentation to help make your job easier, provide reliable data for decision making and improve the efficiency of your facility. We are here to support you in your work. Our knowledgeable customer service and technical support staff can help with any instrument or application questions you may have.

Thank you for your interest in YSI and for reviewing our catalog. Please contact us with any questions, concerns or comments.

Laura St. Pierre | *Senior Product Manager, WQS*



# Monitoring & Control **aquaculture**

## Applications

RAS (recirc systems)  
Raceways  
Ponds  
Cages  
Live Haul  
Aquariums  
Research  
Aquaponics  
Aquatic Life Support



## 5200A

Aquatic Life Support  
Aquaponics  
Dissolved Oxygen (polarographic)  
pH



Conductivity  
Temperature  
ORP  
Salinity  
TDS



## 5400

Dissolved Oxygen (galvanic)  
Temperature  
External devices\*

## 5500D

Dissolved Oxygen (optical)  
Temperature  
External devices\*



## IOEM/REM

Integrate other devices  
Expand outputs  
Add relays  
Send data to PLC or SCADA

\* External devices refers to the ability to input signals from other devices such as TGP, DO, pH, photo period, etc.

## Monitors at a Glance

**Dependability.** Monitoring and controlling with the 5200A, 5400, and 5500D is managed locally by the instrument, not at a central PC or PLC. This provides security that an entire system won't fail.

**Scalability.** Easy to use with low cost of ownership. User-scalable as your facility changes, unlike typical PLCs or DCPs. No engineers or programmers needed to change or add to the system.

**Multiparameter and multilocation capability.** With the ability to measure virtually any parameter using a variety of probes at multiple locations, you can design a total facility solution.

**Feed management.** Feed Smart™ conditional feed timer software is included with every monitor. Very powerful feeding capabilities interface with most powered feeders.

**Improved management tools.** With the AquaViewer II app, you will have access to water quality data (current data, historical data, alarm events, etc.) to better manage your operation and improve efficiency. SMS and email alarms quickly notify if parameters exceed user-defined limits. Data can be easily accessed remotely using the AquaViewer II app.

**Flexibility.** Mix and match monitor and control instruments as well as expansion modules for flexibility in designing a system to best meet facility needs.

# 5200A Multiparameter Monitor

Designed specifically for aquaculture and aquatic life support systems, the **5200A** integrates water quality monitoring, process control, feeding, alarming, and data management into one instrument. Multiparameter monitoring functionality for dissolved oxygen (DO), temperature, pH, ORP, conductivity, and automatic salinity compensation. Plus, two configurable inputs for additional sensors and management.

## Features

- 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; can be integrated with 5400 and 5500D monitors and expansion modules
- Flexible dosing and control software
- SMS and email alarming
- Graphic interface function for quick, reliable system-status checks
- Plug-and-play – easy to install, setup, and maintain
- Photo period management
- Control parameters with set points, dosing, or PID functions



## 5200A Specifications

### Conductivity

**Range:** 0-200  $\mu$ S, 0-2000  $\mu$ S, 0-20 mS, 0-200 mS

**Resolution:** 0.1  $\mu$ S in 200  $\mu$ S range; 1  $\mu$ S in 2000  $\mu$ S range; 0.01 mS in 20 mS range; 0.1 mS in 200 mS range

**Accuracy:**  $\pm$ 0.5% of range (0-100 mS);  $\pm$ 1.0% of reading (100-200 mS)

### Dissolved Oxygen

**Description:** Polarographic; automatic salinity compensation

**Range:** 0-500% air saturation; 0-60 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:**  $\pm$ 2% of reading or  $\pm$ 2% DO sat, whichever is greater (0 to 200%)  
 $\pm$ 0.2 mg/L or  $\pm$ 2% of reading, whichever is greater (0 to 20 mg/L)  
 $\pm$ 6% of reading (20 to 60 mg/L) (200-500%)

### ORP

**Range:** -2000 mV to 2000 mV

**Resolution:** 1 mV

**Accuracy:**  $\pm$ 20 mV

### pH

**Range:** 0.0-14.0 units

**Resolution:** 0.01 units

**Accuracy:**  $\pm$ 0.2 pH

### Salinity (calculated from conductivity and temperature)

**Range:** 0-80 ppt (0-50 manual input)

**Resolution:** 0.1 ppt

**Accuracy:**  $\pm$ 2% or  $\pm$ 0.1 ppt, whichever is greater

### Temperature

**Range:** 0-45°C (32-113°F)

**Resolution:** 0.1°C

**Accuracy:**  $\pm$ 0.2°C

**Timers** 4 timers – 10 cascading events with start/duration setting; 1 feed timer channel

**Communication Ports** Standard: RS485 network (optically isolated) and RS232. Optional: Ethernet TCP/IP and wireless

**Data Logger** Non-volatile, 2000 data records, 1250 relay/alarm/event records, 1000 entries/configurations/change records, 500 GLP/calibration records

**Warranty** 2-year on instrument; 1-year on probe/cable

**Auxiliary Inputs\*** 2 user-configurable inputs, digital or analog (0 to 1.0 VDC or 0 to 5.0 VDC or 4 – 20 mA)

**Ratings** ETL, cETLus, EMC, CE, RoHS, WEEE, NEMA 4X (IP-65), Made in the USA

**Output Relays (not fused)** 4 internal 10A at 110VAC (5A at 240 VAC) relays for parameter control and/or alarm

**Alarming** Local, email, and/or SMS alarming. Up to 3 emails with Ethernet Module or 10 emails with AquaManager®

**Power Requirements** Option 1: 12 VDC; Option 2: 100/240 VAC switches to 12 VDC backup

**Display** Graphic LCD; extended temp range LCD with backlight

**Size** Height: 6.5 in (16.5 cm); Length: 8.5 in (21.6 cm); Depth: 4.75 in (12.1 cm)

**Enclosure** NEMA 4X

### Parameters

Dissolved Oxygen  
(polarographic)

pH

Conductivity

Temperature

ORP

Salinity

Additional  
user-configurable inputs\*

\*User-configurable inputs can be used for additional sensors like DO, pH, TGP, ORP, level, pressure, etc. Some sensors require an additional transmitter.

# 5400/5500D MultiDO Monitors

Our continuous multi-channel dissolved oxygen (DO) monitoring and control instruments are designed specifically for aquaculture systems. Easily manage a full-scale farming operation with expandable capabilities.



Access data remotely



## YSI 5400

The 5400 continuous monitor for dissolved oxygen (DO) with a galvanic sensor – along with AquaManager® software – integrates process control, feeding, alarming, and data management into one product.

## YSI 5500D

The 5500D Optical DO (ODO) monitoring & control instrument continuously monitors your farming operation's water quality for DO using optical-based ODO technology. Choose 1, 2, or 4 DO channels. Lower maintenance and recalibration requirements with ODO measurement technology.

## Features

- Ethernet TCP/IP or wireless communications – optional
- Event logging records calibrations, high/low conditions, and more
- Conditional feed timer with Feed Smart™ software included
- Networking capability up to 32 instruments per communications port and can be integrated with 5200A, 5400, 5500D and expansion modules
- Instruments monitor system functionality
- Graphical interface for easy viewing and menu navigation
- Plug-and-play – easy to install, setup, and maintain
- Flexible monitoring and control software
- Email and SMS alarming
- Photo period management
- Control parameters with set points, dosing, or PID functions
- User-selectable salinity range to compensate for DO

## Specifications

5400 5500D

### Dissolved Oxygen

<b>Description</b>	4 DO channels; <b>Galvanic</b>	●	
	up to 4 DO channels; <b>Optical</b>		●
<b>Range</b>	0 to 500% air saturation; 0 to 60 mg/L	●	
	0 to 500% air saturation; 0 to 50 mg/L		●
<b>Resolution</b>	0.1% (0.0 to 99.9%); 1% (>99.9%); 0.01 mg/L (0 to 10 mg/L); 0.1 mg/L (10 to 60 mg/L)	●	●
<b>Accuracy</b>	±2% of reading or ±2% DO sat, whichever is greater (0 to 200%) ±0.2 mg/L or ±2% of reading, whichever is greater (0 to 20 mg/L) ±6% of reading (200 to 500%; 20 to 60 mg/L)	●	
	±1% of reading or ±1% DO sat, whichever is greater (0 to 200%); ±0.1 mg/L or ±1% of reading, whichever is greater (0 to 20 mg/L); ±10% of reading (200 to 500%) (20 to 50 mg/L)		●

### Salinity Input

<b>Range</b>	0 to 50 ppt; manual (automatically compensates DO for manual input value)	●	●
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### Timers

<b>Description</b>	4 timers – 10 cascading events with start/duration setting; 4 feed timer channels	●	●
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### Communication Ports

<b>Description</b>	Standard: RS485 network (optically isolated) and RS232 Optional: Ethernet TCP/IP and wireless	●	●
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### Data Logger

<b>Description</b>	Non-volatile, 2000 data records, 1250 relay/alarm/event records, 1000 entries/configurations/change records, 500 GLP/calibration records	●	●
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### Warranty

<b>Description</b>	2-year on instrument; 1-year on probe/cable	●	
	2-year on instrument, probe/cable		●

### Auxiliary Inputs\*

<b>Description</b>	6 user-configurable inputs digital or analog (0 to 1.0 VDC, 0 to 5.0 VDC or 4-20 mA) 4 auxiliary inputs can be configured for temperature inputs	●	●
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### Ratings

<b>Description</b>	ETL, cETLus, EMC, CE, RoHS, WEEE, NEMA 4X (IP-65), Made in the USA	●	●
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### Output Relays (not fused)

<b>Description</b>	10A at 110VAC (5A at 240VAC)	●	●
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### Alarming

<b>Description</b>	Local, email, and/or SMS alarming. Up to 3 emails with Ethernet Module or 10 emails with AquaManager®	●	●
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### Power Requirements

<b>Description</b>	Option 1: 12 VDC; Option 2: 100/240 VAC; switches to 12 VDC backup	●	●
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### Display

<b>Description</b>	Graphic LCD; extended temp range LCD with backlight	●	●
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### Size

<b>Dimension of Controller</b>	Height: 6.5 in (16.5 cm); Length: 8.5 in (21.6 cm); Depth: 4.75 in (12.1 cm)	●	●
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### Enclosure

<b>Description</b>	NEMA 4X	●	●
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## Parameters

### 5400

Dissolved Oxygen (galvanic)  
Temperature  
Additional user-configurable inputs\*

### 5500D

Dissolved Oxygen (optical)  
Temperature  
Additional user-configurable inputs\*



\*User-configurable inputs can be used for additional sensors like DO, pH, TGP, ORP, level, pressure, etc. Some sensors require an additional transmitter.

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

[ysi.com/5500D](http://ysi.com/5500D)

# Expansion Modules for Monitoring & Control

## Applications

RAS  
Raceways  
Ponds  
Sea cages  
Live haul  
Aquariums  
Research

Ensure healthy livestock and maximum profits with tighter control of water quality and system parameters. The YSI IOEM and REM expansion modules increase the flexibility and capability of the YSI aquaculture monitoring and control platform when networked with the 5200A, 5400 and/or 5500D instruments.



## IOEM Features

- 4 (IOEM-4) or 8 (IOEM-8) user-configurable channels as inputs or outputs
- Optically isolated to eliminate electrical interferences and ground loops
- When configured as outputs (4-20 mA) either set point or PID control can be used
- 4-20 mA outputs can interface to a SCADA or PLC system
- Inputs can be used for temperature, analog (0 to 1.0 VDC, 0 to 5.0 VDC or 4-20 mA) or digital\*

## REM Features

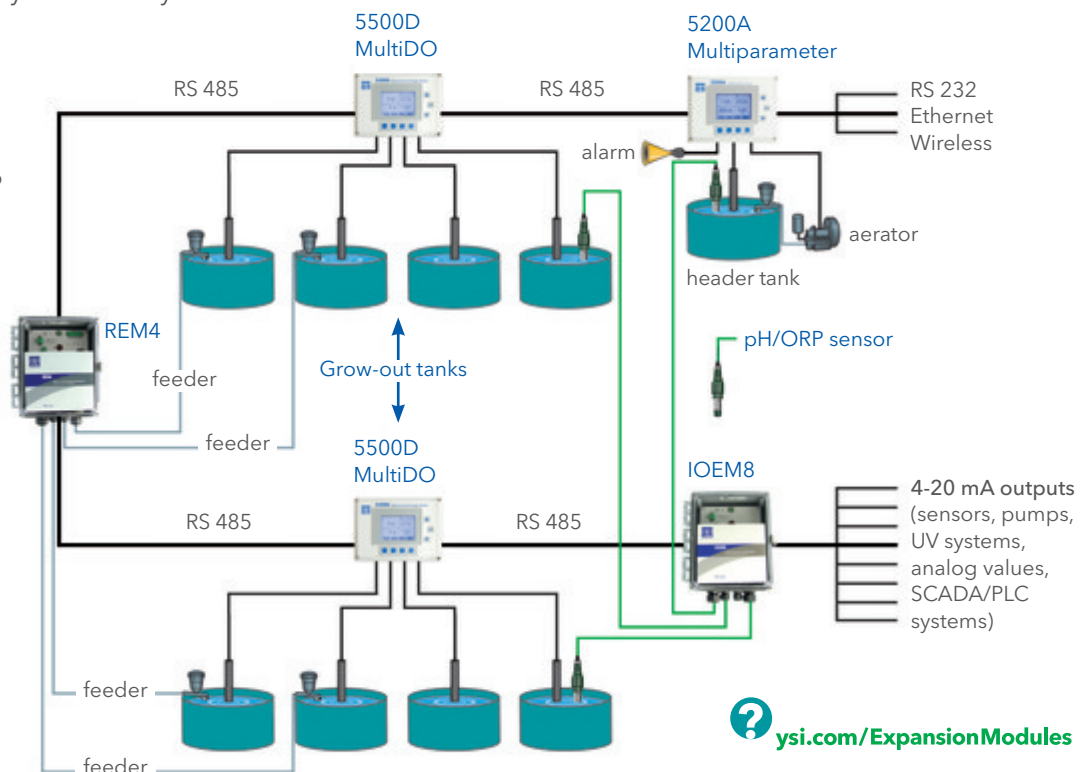
- 4 user-configurable output relays

\*user-configurable inputs can be used for additional sensors like DO, pH, TGP, ORP, level, pressure, etc. Some sensors require an additional transmitter.

## IOEM and REM Features

- Plug-and-play: easy to install, setup and maintain
- NEMA 4X enclosure (IP-66 rated)
- AC and DC power (DC power can be used for battery back-up if used with AC power)
- 2 year warranty

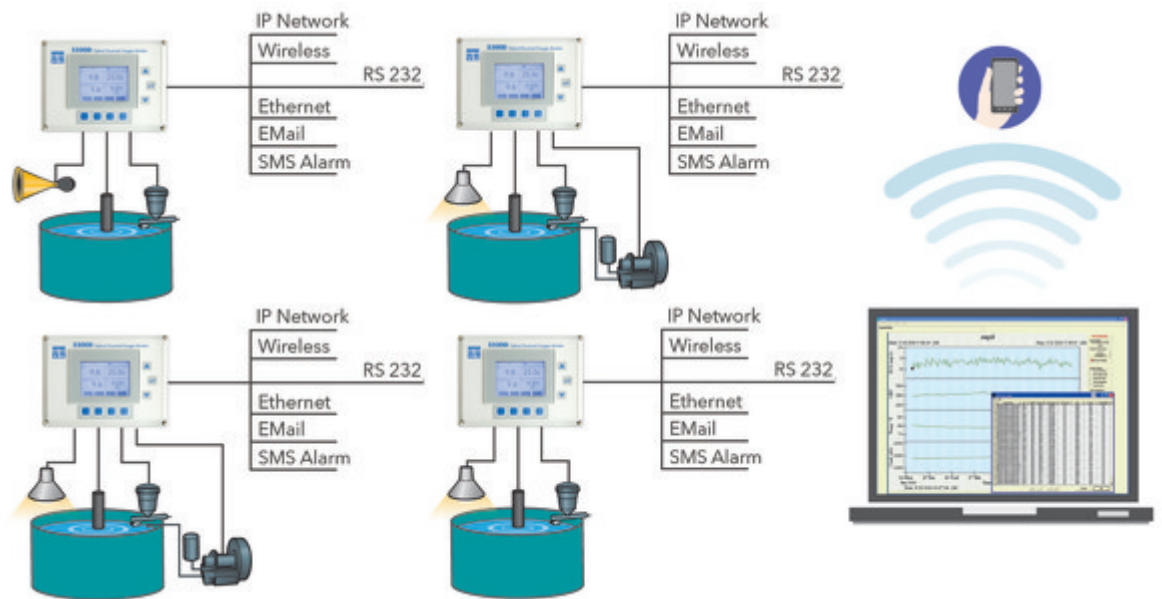
**Example of three monitors individually monitoring and controlling nine tanks with two expansion modules to control feeders, 3rd party sensors, lighting, and to send data to SCADA/PLC system.**



[ysi.com/ExpansionModules](https://www.ysi.com/ExpansionModules)



# Networking User-Configurable



Example of multiple monitors individually controlling tanks integrated into the same network with various communications channels.



## Examples of Additional Inputs

### MJK pHix<sup>®</sup> pH or ORP and optional Temperature (with pH) sensor

The compact, threaded design, makes pHix<sup>®</sup> very simple to mount in-line and in open tanks. The 2-wire 4-20 mA loop powered output easily connects to YSI's IOEM (Input Output Expansion Module). One-year warranty on the sensor and 6 months on the electrode.

#### Features

- Fully submersible
- LED indicator light shows operation and calibration status
- Available with 4-20 mA output for pH or ORP or Temperature (with pH)
- Can withstand harsh conditions, made from chemical resistant Ryton<sup>®</sup> and 316 SS
- One-year factory warranty



### MJK float switch 7030

The MJK 7030 float switch provides a trustworthy digital signal, combining simplicity and durability. Float switches are often used for controlling and/or alarms of high and low water levels in tanks, raceways or sumps.

#### Features

- Electro-mechanical contact system
- Environmentally friendly, made rugged with polypropylene and without mercury

# Benefit Overview



## **Feed Smart™** (included)

### **Conditional feed timer around the clock**

**Feed Smart™ software** can be used as a basic feed timer or conditional feed timer. Manages 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 which reduces, or stops, feeding as water quality deteriorates.

- Saves money on feed
- Eliminates excess food deteriorating water quality
- Feed when fish need to eat
- Increase yields
- Interfaces with most powered feeders
- Increase feeding daily based on FCR
- Select when to feed – time periods and days of the week (up to 100 times daily)
- Calculates biomass
- Saves money on labor and is significantly less expensive than other automated feeding options

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## **Outputs/Timers** (included)

### **5400/5500D**

- 8 relays 10A at 110VAC (5A at 240VAC)
- 4 timers – 10 cascading events with start/duration setting
- 4 Feed Smart channels
- Email and/or SMS alarming up to 3 emails with Ethernet module or up to 10 emails with AquaManager®
- Local alarm; configurable to relay

### **5200A**

- 4 each 10A at 110VAC (5A at 240VAC)
- 4 timers – 10 cascading events with start/duration setting
- 1 Feed Smart channel
- Email and/or SMS alarming up to 3 emails with Ethernet module or up to 10 emails with AquaManager®
- Local alarm; configurable to relay

---

## **Inputs** (included)

### **5400/5500D**

- Up to 4 dissolved oxygen (DO) probe inputs
- 6 user-configurable inputs, digital or analog (0 to 1.0 VDC, 0 to 5.0 VDC or 4-20 mA)
- 4 auxiliary inputs can be configured for temperature inputs

### **5200A**

- DO, pH, ORP, conductivity, temp
- 2 user-configurable inputs, digital or analog (0 to 1.0 VDC, 0 to 5.0 VDC or 4-20 mA)\*

\*User-configurable inputs can be used for additional sensors like DO, pH, TGP, ORP, photo period, etc. Some sensors require an additional transmitter.

## Control

Pumps, valves, feeders, alarms, lights, heaters, chillers, blowers, pure O<sub>2</sub>, ozone, etc.

## Monitor and control continuously



AquaViewer II app screenshot of current data



## Software Benefits

The AquaViewer II app gives you real-time water quality data so you can keep a close eye on your facility, remotely. Data is collected every 10 minutes, on the server, for accurate water quality conditions.

## Control Relays (included)

The **5400/5500D** comes with 8 internal relays and the **5200A** comes with 4 internal relays available for control outputs. The relays are accessible through terminal blocks on the I/O panel inside the enclosure. The terminal blocks provide Normally Open, Normally Closed, and Common Connections to the relays. Select set point, dosing, or PID control mode. With the REM expansion module, add up to 4 more relays to the network.

## Expandability

### Inputs/Outputs

Add up to 8 user-configurable inputs/ outputs with IOEM expansion modules. Inputs can be configured as digital or analog and used for additional sensors like dissolved oxygen, pH, Total Gas Pressure, ORP, photo period, etc. 4 to 20 mA outputs can send data to facility or PLC or SCADA.

### Power (Options)

#### Option 1 (12 VDC)

Configuration for mobile live-haul applications, or anytime AC power is not available.

#### Option 2 (100-240 VAC)

The system will automatically switch to 12 VDC back-up operation and sound an alarm if primary voltage drops below safe operating range.\*

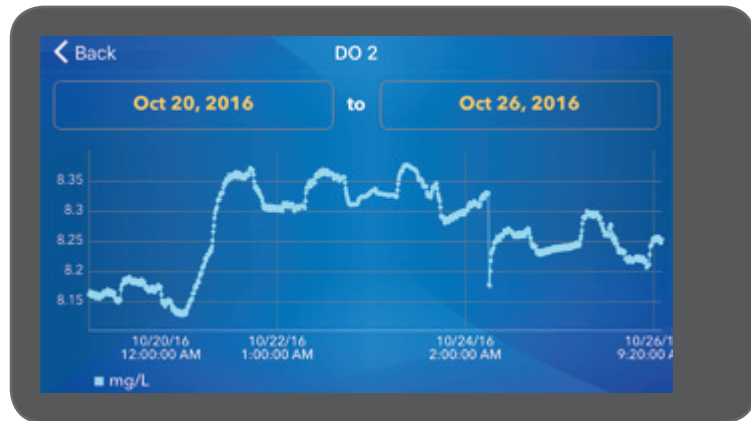
\*12 VDC back-up power supply is optional. Contact YSI for more information.

# Real Time, Remote Data

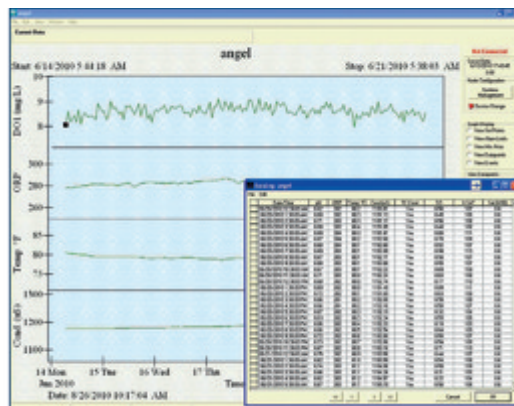
## AquaViewer II® App

The AquaViewer II app helps you keep a close eye on the water quality in your aquaculture or aquatic life support facility, remotely. It's Monitoring Made Mobile! The AquaViewer II app displays current and logged data acquired from YSI continuous monitoring and control aquaculture instruments - the 5200A, 5400 and 5500D. Current data is updated every 10 seconds giving the operator precise, real-time data. Data is logged every 10 minutes for historical data.

- Real-time water quality data, accessible at a finger's touch
- Easily view the status of your tanks with color-coded icons
- Alarms can be sent via email, text and badge notifications to ensure you are alerted when alarm conditions are met
- Data is collected every 10 minutes, on the server, for accurate water quality conditions
- Cloud-based system stores data
- Easily view historical data
- Configure tanks and map in AquaManager for display in the app
- Greater flexibility to display data with responsive pages that adapt to the size of your screen (mobile-friendly)
- Easy to use with simple menu structure



above:  
AquaViewer II app displaying historical data in a graph



left:  
You can view your data instantly in tabular or graphical formats.

## AquaManager® (optional)

AquaManager® desktop software allows you to control and set up any instrument on the network, view data, set alarming options, and change relays or set points depending on application – conveniently from one central location.

Instantly see an overview of your facility, manage parameter set points, and manage your data in order to make informed operational decisions in real time. The browser-based format makes navigation and maintenance easy.

The facility-mapping feature provides an immediate overview of all ponds or tanks indicating their current state.

All parameter and most system settings can be managed from the desktop with the AquaManager software.



# How to Order

## Step 1: Choose Monitor.

You can also go to [ysi.com/aquaculture](http://ysi.com/aquaculture) to choose the best system for your application.

### 5500D

- 5500D-01-DC:** Single channel optical DO monitor, 12 VDC, power supply not included
- 5500D-01-AC:** Single channel optical DO monitor, 110-240 VAC
- 5500D-02-DC:** Two channel optical DO monitor, 12 VDC, power supply not included
- 5500D-02-AC:** Two channel optical DO monitor, 110-240 VAC
- 5500D-04-DC:** Four channel optical DO monitor, 12 VDC, power supply not included
- 5500D-04-AC:** Four channel optical DO monitor, 110-240 VAC

### 5400

- 5400-DC:** Four channel galvanic DO monitor, 12 VDC, power supply not included
- 5400-AC:** Four channel galvanic DO monitor, 110-240 VAC, with 115 VAC US cord

### 5200A

- 5200A-DC:** Multiparameter monitor (DO, temp, pH, ORP, salinity), 12 VDC, power supply not include
- 5200A-AC:** Multiparameter monitor (DO, temp, pH, ORP, salinity), 110-240 VAC, with 115 VAC US cord

## Step 2: Order Expansion Modules (as needed).

- IOEM-4 AC/DC\*:** Networkable module that has 4 user-configurable Inputs/Outputs
- IOEM-8 AC/DC\*:** Networkable module that has 8 user-configurable Inputs/Outputs
- REM-4 AC/DC\*:** Networkable module that has 4 user-configurable relay outputs

## Step 3: Order Probes and Cables.

### 5500D

- 626200-X:** 1-, 4-, 10-, 20-, 30-, 40-, 50-, 60-, or 100-meter cable with optical DO probe

### 5400

- 5421-4, 10, 20, or 30:** 4-, 10-, 20-, 30-meter cable with galvanic DO probe/Temp
- 5420-4, 10, 20, or 30:** 4-, 10-, 20-, 30-meter cable with galvanic DO probe/no Temp

### 5200A

- 5561-4, 10, 20, or 30:** 4-, 10-, 20-, 30-meter cable with polarographic DO probe/Temp
- 5562-4, 10, or 20:** 4-, 10-, 20-meter cable with polarographic DO/Temp/Cond (order pH or pH/ORP sensor separately)
- 5564:** pH Sensor
- 5565:** pH/ORP Combination Sensor
- 5564A:** Amplified pH Sensor Kit
- 5565A:** Amplified pH/ORP Combination Sensor Kit

## Step 4: Order Accessories.

- 606480-xx:** AquaViewer II App; "xx" will be the number of monitoring instruments for mapping to the iOS AquaViewer II App\*
- 5209A:** AquaManager® Desktop Software; 5200A, 5400, 5500D (version 6.0 or later required for configuration)
- 5402:** Serial to Ethernet Module; 5200A, 5400, 5500D
- 5204:** DO Membrane Kit, 2 mil Teflon for polarographic (6 membranes with electrolyte); 5200A
- 5405-5:** DO Membrane Kit, 2 mil Teflon for galvanic; 5400
- 5405-25:** DO Membrane Kit, 2 mil Teflon for galvanic (25 membranes with electrolyte); 5400
- 5406:** DO Probe Solution, 1 Pint (473 mL) for galvanic (5 membranes with electrolyte); 5400
- 5205:** Probe Mounting Kit; 5200A (requires separate power supply)
- 5909:** DO Cap Membrane Kit, 2 mil PE for polarographic (6 caps and solution); 5200A
- 6505:** Weather Shield; 5200A, 5400, 5500D
- 6506:** Desiccant Kit; 5200A, 5400, 5500D, IOEM, REM
- 6509:** Rail Mount Kit; 5200A, 5400, 5500D
- 6510:** Panel Mount Kit; 5200A, 5400, 5500D
- 606100:** 230 VAC cord, European
- 606101:** 230 VAC cord, UK
- 606102:** 230 VAC cord, Australia
- 6513:** Expansion Module Weather Shield
- 6514:** Expansion Module Rail Mount Kit

\*Must be used with a 5200A, 5400 and/or 5500D and configured via AquaManager®

For help with designing an M&C system, contact Darrin Honious, YSI's Aquaculture Expert at: [dhonious@ysi.com](mailto:dhonious@ysi.com) 937-767-7241 ext. 246

# Connect with YSI



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## Application Notes

Aquaculture Resources  
[ysi.com/aquaculture](https://ysi.com/aquaculture)

## Xylem |'zīləm|

- 1) The tissue in plants that brings water upward from the roots;
- 2) a leading global water technology company.

We're a global team unified in a common purpose: creating advanced technology solutions to the world's water challenges. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. Our products and services move, treat, analyze, monitor and return water to the environment, in public utility, industrial, residential and commercial building services, and agricultural settings. With its October 2016 acquisition of Sensus, Xylem added smart metering, network technologies and advanced data analytics for water, gas and electric utilities to its portfolio of solutions. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise with a strong focus on developing comprehensive, sustainable solutions.

For more information on how Xylem can help you, go to [xylem.com](http://xylem.com)



a xylem brand

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