Aquaculture

CONTINUOUS MONITORING AND CONTROL

YSI

a **xylem** brand

YSI AQUACULTURE
PROVEN. TRUSTED.

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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

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
External devices*

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. Mulitparameter 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

Access data remotely

ysi.com/5200A

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5200A Specifications

Conductivity

Range: 0-200 μs, 0-2000 μs, 0-20 mS, 0-200 mS

Resolution: 0.1 μs in 200 μs range; 1 μs in 2000 μs range; 0.01 mS in 20 mS range; 0.1 mS in 200 mS range

Accuracy: ±0.5% of range (0-100 mS); ±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: ±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 (20 to 60 mg/L) (200-500%)

ORP

Range: -2000 mV to 2000 mV

Resolution: 1 mV

Accuracy: ±20 mV

pH

Range: 0.0-14.0 units

Resolution: 0.01 units

Accuracy: ±0.2 pH

Salinity (calculated from conductivity and temperature)

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

Resolution: 0.1 ppt

Accuracy: ±2% or ±0.1 ppt, whichever is greater

Temperature

Range: 0-45°C (32-113°F)

Resolution: 0.1°C

Accuracy: ±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			
Description	4 DO channels; Galvanic	●	
	up to 4 DO channels; Optical		●
Range	0 to 500% air saturation; 0 to 60 mg/L	●	
	0 to 500% air saturation; 0 to 50 mg/L		●
Resolution	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)	●	●
Accuracy	±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			
Range	0 to 50 ppt; manual (automatically compensates DO for manual input value)	●	●
Timers			
Description	4 timers – 10 cascading events with start/duration setting; 4 feed timer channels	●	●
Communication Ports			
Description	Standard: RS485 network (optically isolated) and RS232 Optional: Ethernet TCP/IP and wireless	●	●
Data Logger			
Description	Non-volatile, 2000 data records, 1250 relay/alarm/event records, 1000 entries/configurations/change records, 500 GLP/calibration records	●	●
Warranty			
Description	2-year on instrument; 1-year on probe/cable	●	
	2-year on instrument, probe/cable		●
Auxiliary Inputs*			
Description	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	●	●
Ratings			
Description	ETL, cETLus, EMC, CE, RoHS, WEEE, NEMA 4X (IP-65), Made in the USA	●	●
Output Relays (not fused)			
Description	10A at 110VAC (5A at 240VAC)	●	●
Alarming			
Description	Local, email, and/or SMS alarming. Up to 3 emails with Ethernet Module or 10 emails with AquaManager®	●	●
Power Requirements			
Description	Option 1: 12 VDC; Option 2: 100/240 VAC; switches to 12 VDC backup	●	●
Display			
Description	Graphic LCD; extended temp range LCD with backlight	●	●
Size			
Dimension of Controller	Height: 6.5 in (16.5 cm); Length: 8.5 in (21.6 cm); Depth: 4.75 in (12.1 cm)	●	●
Enclosure			
Description	NEMA 4X	●	●

Parameters

5400

Dissolved Oxygen (galvanic)

Temperature

Additional user-configurable inputs*

5500D

Dissolved Oxygen (optical)

Temperature

Additional user-configurable inputs*

WE KNOW™ D.O.

*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

ysi.com/5500D

Expansion Modules
for Monitoring & Control

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*
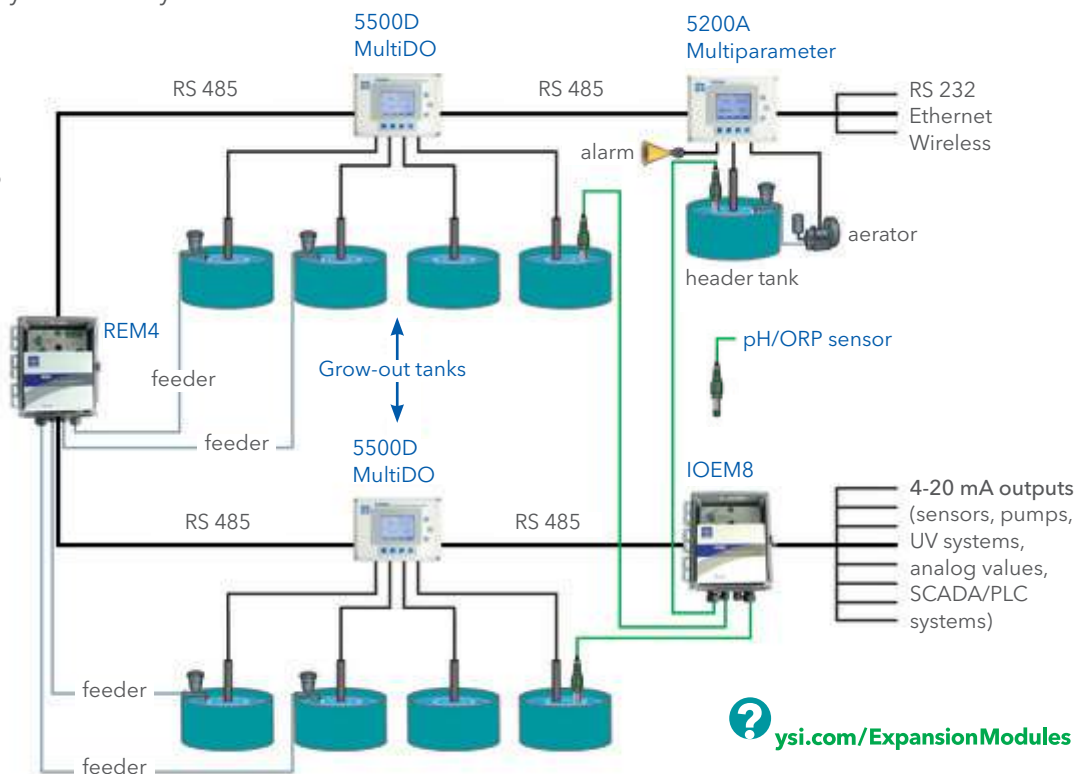
REM Features
• 4 user-configurable output relays

*user-configurable inputs can be used for additional sensors like DO, pH, TGP, ORP, level, pressure, etc. Some sensors require an additional transmitter.
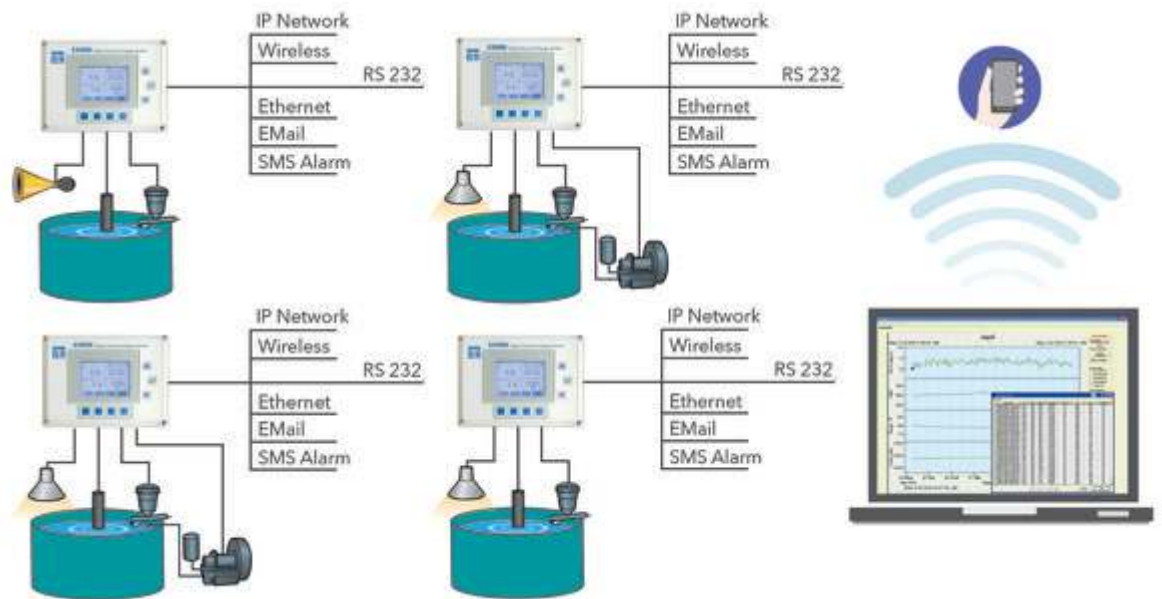
IOEM and REM Features
• Plug-and-play: easy to install, setup and maintain
• NEMA 4X enclosure (IP-66 rated)
• AC and DC power (DC power can be used for battery back-up if used with AC power)
• 2 year warranty

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.

5500D MultiDO
5200A Multiparameter
RS 485
RS 485
RS 232 Ethernet Wireless
alarm
aerator
header tank
REM4
feeder
Grow-out tanks
pH/ORP sensor
feeder
5500D MultiDO
IOEM8
RS 485
RS 485
4-20 mA outputs (sensors, pumps, UV systems, analog values, SCADA/PLC systems)
feeder
feeder

ysi.com/ExpansionModules

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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® pH or ORP and optional Temperature (with pH) sensor

The compact, threaded design, makes pHix® 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® 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

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

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

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)*

Control
Pumps, valves, feeders,
alarms, lights, heaters,
chillers, blowers,
pure O_2, 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
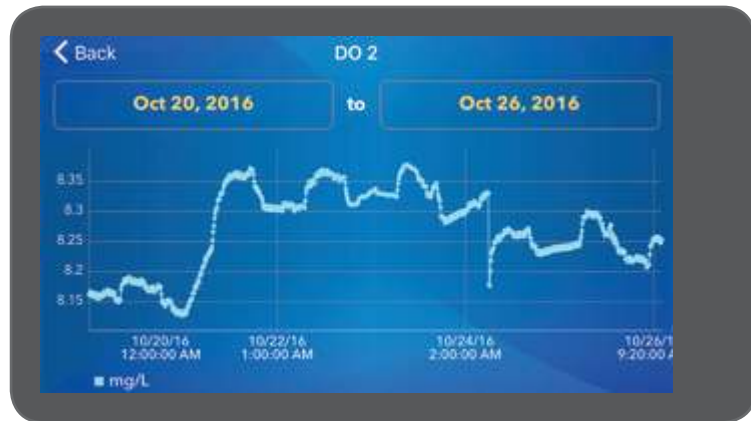
above:
AquaViewer II app displaying historical data in a graph
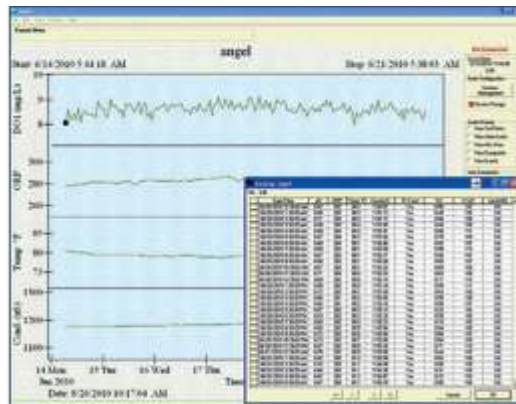
left:
You can view your data instantly in tabular or graphical formats.

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.

? **ysi.com/AquaViewerII**

? **ysi.com/AquaManager**
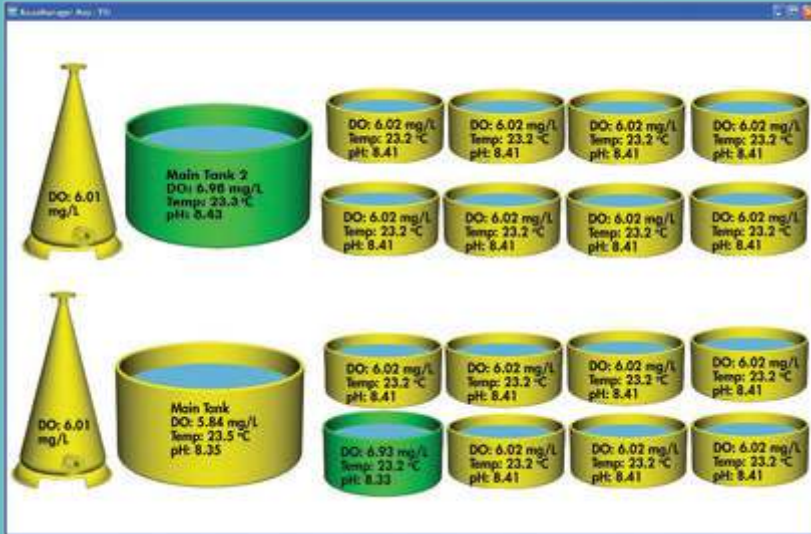
To quickly identify changes or issues at your facility, a visual map can be created to look like your facility. When displayed on a monitor, anyone can see where and when maintenance or action is needed. Real-time data is continually displayed. A facility JPEG or BMP file can be used as a background, and data easily added. Building a map of your facility is easy – use the provided background file, add data and choose icons from the library.

All tanks have options to show their state of activity from Inactive (operating normally), Active (some form of control is taking place), or Alarm (beyond the set point limit and control hasn't corrected it).

Quickly identify with visual cues how your facility is operating.

How to Order

Step 1: Choose Monitor.
You can also go to 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

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

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

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Application Notes

Aquaculture Resources
ysi.com/aquaculture

Xylem |ˈzīləm|

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**

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Let's Solve Water

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