



# IQ SENSOR NET

CONTINUOUS PROCESS MONITORING & CONTROL



a xylem brand



## **Innovative Solutions for Challenging Problems**

WTW, a Xylem brand, is committed to providing our customers with solutions to their most challenging problems through the use of our expertise and innovative technology.

As part of that commitment, WTW continues to develop and launch new innovative product lines, building upon our proven sensor and analytics technology. We take pride in improving and setting new standards in the markets that we serve.

If you want to know more about Xylem, please visit [www.xylem.com](http://www.xylem.com).

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## Online Instrumentation

The IQ SENSOR NET has for many years set the standard for online measuring technology. It is suitable for conventional instrumentation with analog outputs as well as for field bus instrumentation.

The innovative digital sensors in this system represent the state of the art in process measuring. A new controller family MIQ/MC2 with integrated USB and LAN interfaces opens the IQ SENSOR NET system to the future-proof world of internet communication via TCP/IP technology. The new spectral UV-VIS sensors CarboVis®, NitraVis®, and NiCaVis® allow for chemical-free measurements of COD, TOC, BOD, SAC, NO<sub>3</sub>, and TS directly in the wastewater process.

Their new optical design, integrated ultrasonic cleaning system and high-tech materials Titanium and PEEK assure high measurement reliability, simple handling, and extreme durability. The new interface level sensor IFL 700 IQ is ideal for sludge management at wastewater treatment plants: based upon the ultrasonic measuring principle, it detects sludge-water interface levels via runtime of ultrasound signal echoes.

The IQ SENSOR NET system is therefore the most flexible, digitally based system that provides from 1 to 20 measuring points. For the measuring and control of wastewater, WTW offers the world's most complete line of pH/ORP, D.O., Conductivity, Nitrogen, Carbon, Phosphate, and unique self-cleaning Turbidity instrumentation, as well as comprehensive accessories.

The dependability, reliability, and versatility of WTW field-proven Ammonia, Phosphate, Nitrite, and Nitrate analyzers, probes; and pH, ORP, D.O., and Conductivity systems and meters have established WTW products as industry standards world-wide. WTW has built a solid reputation in its more than 60-year history by providing "best in class" products with unparalleled customer and technical support.

WTW strives to deliver solutions to our customers' measuring problems. Our Customer Care Centers are dedicated to ensuring each customer's individual success. WTW's extensive applications library, coupled with knowledgeable applications specialists, provide for rapid resolutions to technical challenges. With support facilities around the globe, the WTW manufacturing center, located just south of Munich, Germany, delivers quality technical instrumentation with continuous support. We are proud to present our product offering to you and look forward to serving your needs. "Made in Germany."



# IQ SENSOR NET 2020 XT

Improve operational efficiency with continuous data. With an easily scalable solution, the 2020 XT allows for the connection of up to 20 sensors. Add sensors at any time and at any location or change them out with ease. This completely modular plug-and-play system allows you to monitor and control the water quality in your wastewater facility continuously and accurately.

## Only WTW can offer:

- 3-year warranty
- Ultrasonic cleaning on some sensors
- System-wide lightning protection
- Modular expansion from 1 to 20 sensors
- Easily stack modules without extra wiring
- One cable for power and communications
- Factory-calibrated optical DO cap with a 2-year warranty
- USB interface (can be used for security)
- System redundancy for backup control

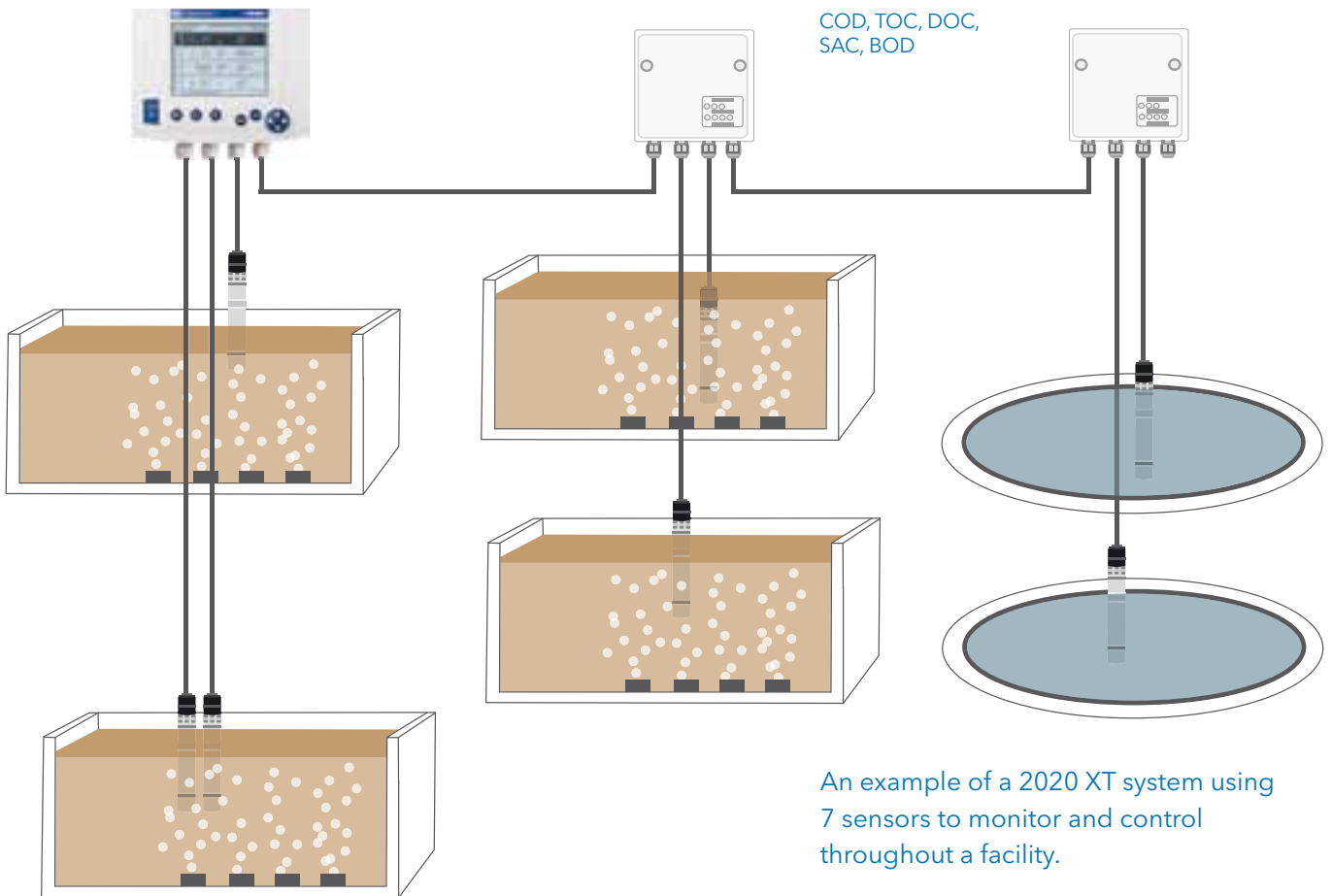


## The System 2020 XT

- Up to 20 digital sensors, any combination
- Easy, intuitive system expansion
- Centralized power supply along entire network
- Numerous relays and outputs may be selected
- Communications via modem, Bluetooth, radio transmission, PROFIBUS, MODBUS, RS-232
- LED status update
- Integrates into existing systems
- Change or move parameters at any time with ease

### Parameters

Temperature  
Dissolved oxygen  
(optical or electrochemical)  
pH  
ORP  
Conductivity/  
Specific conductance  
Salinity  
Turbidity  
TSS  
Ammonium  
Nitrate  
Potassium  
COD, TOC, DOC,  
SAC, BOD



### 2020 XT Terminal

<b>Certifications</b>	ETL, cETL (conforms with relevant UL and Canadian standards), CE
<b>Integrated Lightning Protection</b>	EN 61326 enhanced over voltage protection for entire system
<b>Electrical</b>	Directly via IQ SensorNet when coupled to an MIQ module
<b>Datalogging</b>	525,600 data sets
<b>Display</b>	Graphic; 320 x 240 pixels; backlit
<b>Warranty</b>	3 years
<b>Operating Temperature</b>	-4 to 131° F (-20 to 55°C)

# IQ SENSOR NET 182



The WTW IQ SENSOR NET 182, 182 XT, or 182 XT-4 is a modular system for a complete sensor network ideal for various installation needs. The modular system can accept additional sensors easily at any time. This is a powerful system to continuously measure water quality parameters anywhere in a facility for process control.

## System 182

- Connect 1-4 digital sensors for a variety of parameters
- 2-wire cable provides power and communications
- Ultrasonic cleaning on some sensors
- System-wide lightning protection
- Analog or digital outputs; relays
- 3-year warranty

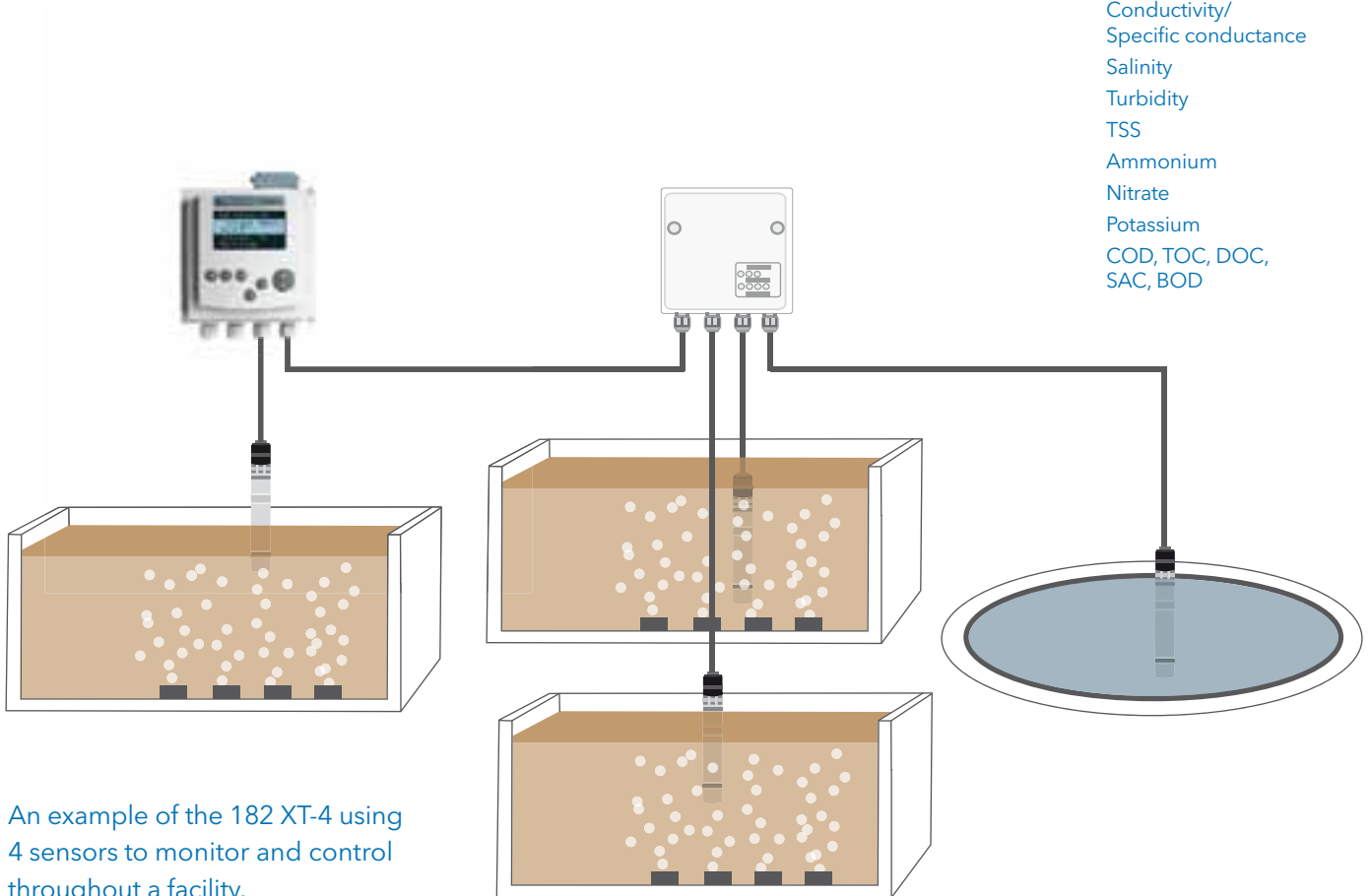


Model 182 XT-4 shown stacked on two IQ SENSOR NET Modules.

Model 182	Model 182 XT	Model 182 XT-4
1-2 sensors	1-2 sensors	1-4 sensors
2 mA outputs	4 mA outputs	5 mA outputs
3 relays	5 relays	6 relays

## Parameters

Temperature  
Dissolved oxygen  
(optical or electrochemical)  
pH  
ORP  
Conductivity/  
Specific conductance  
Salinity  
Turbidity  
TSS  
Ammonium  
Nitrate  
Potassium  
COD, TOC, DOC,  
SAC, BOD



An example of the 182 XT-4 using 4 sensors to monitor and control throughout a facility.

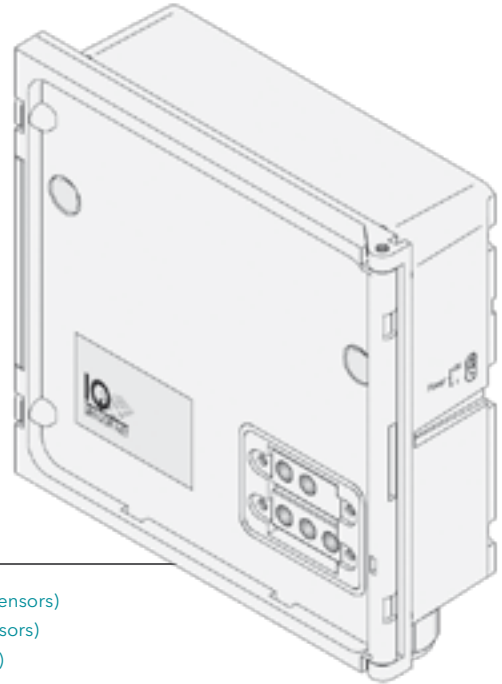
## 182 Terminal

<b>Certifications</b>	ETL, cETL (conforms with relevant UL and Canadian standards), CE
<b>Integrated Lightning Protection</b>	EN 61326 enhanced over voltage protection for entire system
<b>Display</b>	Graphic; 128 x 64 pixels; backlit
<b>Warranty</b>	3 years
<b>Operating Temperature</b>	-4 to 131° F (-20 to 55°C)

# IQ SENSOR NET Modules

IQ SENSOR NET modules provide a variety of functions from power, to communications, to outputs in order to improve your system's efficiency. All modules can be installed anywhere in the system, either individually or in stacks.

Up to three modules can be mechanically connected to form a stack. Simultaneous mechanical and electrical connections are instantaneous once stacked.



## Module Options

	2020 XT (up to 20 sensors) <b>Part Numbers</b>	182 XT-4 (up to 4 sensors) 182 XT (up to 2 sensors) 182 (up to 2 sensors) <b>Part Numbers</b>
Power Supply Modules	MIQ/PS, MIQ/24V	DIQ/S 182/24V, DIQ/S 182 XT/24V, DIQ/S 182 XT-4/24V
Analog Output Modules	MIQ/CR3, MIQ/C6, MIQ/R6	MIQ/CR3, MIQ/C6, MIQ/R6
Interface Modules	MIQ/IF232, MIQ/2-MOD, MIQ/2-PR	DIQ/S 182 XT-4 PR, DIQ/S 182 XT-4 MOD, DIQ/S 182 XT-4 PR/24V, DIQ/S 182 PR, DIQ/S 182 MOD, DIQ/S 182 PR/24V, DIQ/S 182 MOD/24V, DIQ/S 182 XT-4 MOD/24V
Magnetic Valve Modules	MIQ/CHV Plus	DIQ/CHV, MIQ/CHV Plus
Bluetooth Communication Modules	MIQ/BluePS	MIQ/BluePS
Analog Input Modules	MIQ/IC2	MIQ/IC2
Extension Modules	MIQ/JB, MIQ/JBR,	DIQ/JB, MIQ/JB
Compensation Modules	MIQ/MC2, MIQ/2-PR, MIQ/2-MOD	
Controller Modules	MIQ/MC2, MIQ/MC2-PR, MIQ/MC2-MOD	



# IQ SENSOR NET Sensors

All IQ SENSOR NET sensors are rugged, reliable digital sensors designed specifically for wastewater applications. Once a sensor is fixed at a location, it can easily be moved by the user. Sensors can also be switched out with different sensor parameters without rewiring or running conduit. Simply unscrew one and put the new one in place.



## TetraCon® conductivity/salinity/TDS

- 4-electrode design
- robust and durable in the field
- wide measurement range
- fouling resistant
- 2-year warranty

### TetraCon® Sensor

<b>Operating Temperature</b>	32 to 140°F (0 to 60°C)
<b>Conductivity</b>	<b>Range:</b> 0.00 to 20.00 $\mu\text{S}/\text{cm}$ 0.0 to 200.0 $\mu\text{S}/\text{cm}$ 0.000 to 2.000 $\text{mS}/\text{cm}$ 0.00 to 20.00 $\text{mS}/\text{cm}$ 0.0 to 200.0 $\text{mS}/\text{cm}$ 0 to 500 $\text{mS}/\text{cm}$  <b>Accuracy:</b> $\pm 1.5\%$ of reading without calibration $\pm 0.7\%$ of reading with calibration
<b>Salinity</b>	<b>Range:</b> 0 to 70 ppt
<b>TDS</b>	<b>Range:</b> 0 to 2000 $\text{mg}/\text{L}$
<b>Cell Constant</b>	$K = 0.917 \text{ cm}$ (in free solution) $K = 0.933$ (with flow thru adapter)

# IQ SENSOR NET Sensors



## SensoLyt® pH/ORP

- SensCheck function monitors sensors
- electrodes are protected
- easily replace electrodes without tools as needed
- pre-amplified sensors
- digital sensors store calibration
- 2-year warranty (6-months electrodes)

### SensoLyt® Sensor

<b>Operating Temperature</b>	32 to 140°F (0 to 60°C)			
<b>Electrode Type</b>	SEA and SEA-HP pH (gel-polymer solid electrolyte with double pinhole diaphragm; AgCl free and resistant to sulfides)	DWA pH (modified gel electrolyte with single pinhole diaphragm)	ECA pH (gel electrolyte with single pinhole diaphragm)	PtA mV (gel-polymer solid electrolyte with double pinhole diaphragm)
<b>Range</b>	2 to 12 pH units and 4 to 12 pH units	0 to 14 pH units	2 to 12 pH units	± 2000 mV (depends on terminal)



TriOxmatic



FDO

### TriOxmatic® DO electrochemical

- SensReg function monitors electrolytic solution
- SensLeak function monitors for membrane leakage
- fouling resistant
- no break-in period or long-term drift
- digital sensors store calibrations
- 2-year warranty

### FDO® DO optical

- no electrolyte, calibration, interferences, or warm-up period
- zero oxygen consumption technology eliminates the need for stirring
- resistant to bubbles bursting on the sensor with 45 degree angle
- extremely long sensor cap life; factory calibrated
- 2-year warranty

### TriOxmatic® Sensor

<b>Operating Temperature</b>	32 to 140°F (0 to 60°C)		
<b>Electrode Type</b>	Electrochemical DO with reference electrode		
<b>Range</b>	700 IQ (700 IQ SW) 0.0 to 60.0 mg/L 0 to 600%	701 IQ 0.00 to 20.00 mg/L 0.0 to 60.0 mg/L 0.0 to 200.0% 0 to 600%	702 IQ 0 to 2000 µg/L 0.00 to 10.00 mg/L 0 to 110%
<b>Resolution</b>	0.1 mg/L 1%	0.01 mg/L 0.1 mg/L 0.1% 1%	0.001 mg/L 0.01 mg/L 0.1%
<b>Response Time at 25°C</b>	T90 = 180 seconds	T90 = 30 seconds T99 = 90 seconds	T90 = 30 seconds T99 = 110 seconds
<b>Minimum Flow Rate</b>	0.05 m/s (1.9 in/sec)	0.23 m/s (9 in/sec)	0.3 m/s (11.8 in/sec)

### FDO® Sensor

<b>Interferences</b>	None	
<b>Calibration</b>	Factory calibrated	
<b>Operating Temperature</b>	23 to 122°F (-5 to 50°C)	
<b>Electrode Type</b>	Optical DO	
<b>Range</b>	0 to 20.00 mg/L 0 to 200.0%	
<b>Resolution</b>	0.01 mg/L 0.1%	
<b>Response Time at 25°C</b>	FDO 700 IQ T90 = <150 seconds T99 = <200 seconds	FDO 701 IQ T90 = <80 seconds
<b>Minimum Flow Rate</b>	0 - none required	

# IQ SENSOR NET Sensors



## VisoTurb® turbidity

- multi-point factory calibration; no need to recalibrate; matrix adjustment is possible
- ultrasonic cleaning with UltraClean technology; prevents initial biofouling from taking place
- nephelometric measurement technology
- sample discoloration does not affect measurements
- 2-year warranty

## ViSolid® TSS

- multi-point factory calibration; no need to recalibrate; matrix adjustment is possible
- ultrasonic cleaning with UltraClean technology; prevents initial biofouling from taking place
- uses two measurement methods depending on concentrations - either scattered light or backscatter
- 2-year warranty

## VisoTurb® and ViSolid® Sensors

<b>SensCheck</b>	Continually monitors sensor functionality		
<b>Range VisoTurb</b>	FNU, NTU, TEF: 0.05 to 4000 FNU	mg/L SiO <sub>2</sub> ; ppm SiO <sub>2</sub> : 0.1 to 4000 mg/L SiO <sub>2</sub>	g/L TSS: 0.0001 to 400 g/L TSS
<b>Range ViSolid</b>	g/L SiO <sub>2</sub> , % SiO <sub>2</sub> : 0.01 to 300 g/L SiO <sub>2</sub> 0.001 to 30% SiO <sub>2</sub>	g/L TSS, % TSS: 0.003 to 1000 g/L TSS 0.0003 to 100% TSS	



UltraClean technology keeps sensor clean even after a 30-day deployment.





**VARiON®**  
ammonium/nitrate/potassium

- single- or dual-measurement of ammonium and nitrate; compensation for potassium
- factory calibrated
- reference electrode; prevents interferences
- matrix adjustment is possible
- 2-year warranty

**AmmoLyt®** | **NitraLyt®**  
ammonium/potassium | nitrate

- ammonium or nitrate measurement with continuous compensation
- factory calibrated
- reference electrode prevents interferences (potassium for AmmoLyt® and chloride for NitraLyt®)
- matrix adjustment is possible
- 2-year warranty

**VARiON®, AmmoLyt® and NitraLyt® Sensors**

<b>Operating Temperature</b>	32 to 140°F (0 to 40°C)	
<b>Electrode Type</b>	<b>ISE Ammonium (VARiON® or AmmoLyt®)</b>	<b>ISE Nitrate (VARiON® or NitraLyt®)</b>
<b>Range/Resolution VARiON®</b>	NH <sub>4</sub> -N: 1 to 1000 mg/L / 1 mg/L 0.1 to 100 mg/L / 0.1mg/L  NH <sub>4</sub> : 1 to 1290 mg/L / 1mg/L 0.1 to 129.0 mg/L / 0.1 mg/L  K+ (compensation): 1 to 1000 mg/L / 1 mg/L	NO <sub>3</sub> -N: 1 to 1000 mg/L / 1 mg/L 0.1 to 100 mg/L / 0.1 mg/L  NO <sub>3</sub> : 5 to 4500 mg/L / 1 mg/L 0.5 to 450.0 mg/L / 0.1 mg/L  CL- (compensation): 1 to 1000 mg/L / 1 mg/L
<b>pH Range</b>	4 to 8.5 pH units	4 to 11 pH units

# IQ SENSOR NET Sensors



## NitraVis® nitrate/TSS

- optical spectral measurement
- factory calibrated
- ultrasonic cleaning with UltraClean technology; prevents initial biofouling from taking place
- 2-year warranty

## CarboVis® COD/TOC/DOC/BOD/SAC/TSS

- optical spectral measurement
- ultrasonic cleaning with UltraClean technology; prevents initial biofouling from taking place
- continuous real-time values; no sample transport or sample preparation needed
- compensates for interferences and turbidity
- compressed air cleaning available
- 2-year warranty

## NiCaVis® nitrate/COD/TOC/DOC/BOD/SAC/TSS

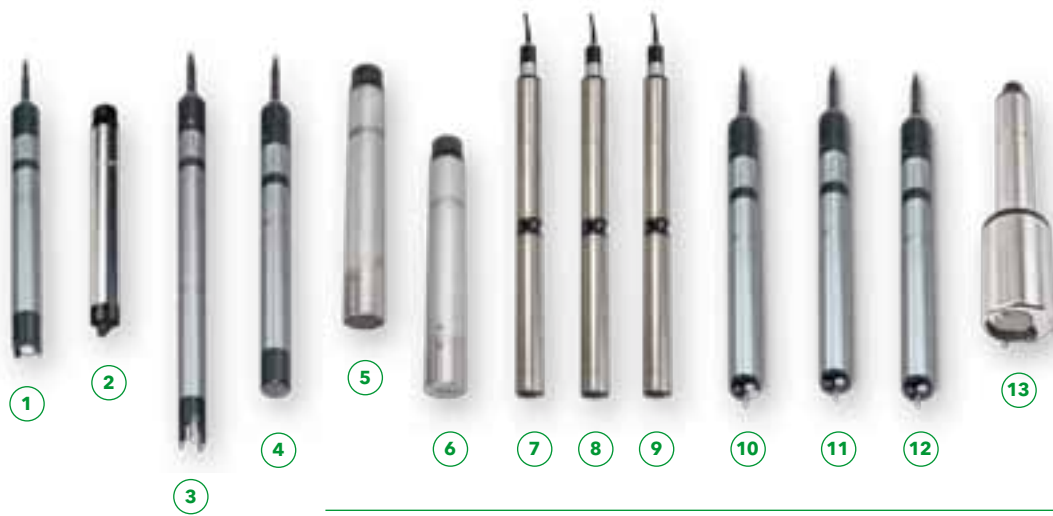
- optical spectral measurement
- continuous real-time values; no sample transport or sample preparation needed
- compensates for interferences and turbidity
- compressed air cleaning available
- 2-year warranty

### NitraVIS® Sensor

<b>Operating Temperature</b>	32 to 113°F (0 to 45°C)	
<b>Electrode Type</b>	Spectral measurement in the UV/VIS range (200 to 720 nm)	
	<b>NitraVis® 701 (influent/aeration)</b>	<b>NitraVis® 705 (effluent)</b>
<b>Range</b>	NO <sub>3</sub> -N: 0.1 to 100.0 mg/L  TSS: 0 to 10.00 g/L	NO <sub>3</sub> -N: 0.01 to 25.0 mg/L  TSS: 0 to 900.0 mg/L
<b>Accuracy</b>	± 3% of measured value ± 0.5 mg/L	
<b>pH Range</b>	4 to 9 pH units	

### CarboVis® and NiCaVis® Sensors

<b>Operating Temperature</b>	32 to 113°F (0 to 45°C)		
<b>Electrode Type</b>	Spectral measurement in the UV/VIS range (200 to 720 nm)		
	<b>CarboVis® 701 (influent/effluent)</b>	<b>CarboVis® 705 (influent/effluent)</b>	<b>NiCaVis® 705 (effluent)</b>
<b>Range</b>	COD: 0.5 to 800.0 mg/L TOC: 1 to 500.0 mg/L SAC: 0.5 to 3000.0 1/m TSS: 0 to 15 g/L (influent) 0 to 4.5 g/L (effluent)	COD: 0.1 to 4000.0 mg/L TOC: 1 to 500.0 mg/L SAC: 0.1 to 600.0 1/m TSS: 0 to 3000 mg/L (influent) 0.0 to 900.0 mg/L (effluent)	COD: 0.1 to 800.0 mg/L TOC: 1 to 500.0 mg/L SAC: 0.1 to 600.0 1/m NO <sub>3</sub> -N: 0.01 to 25.00 mg/L
<b>pH Range</b>	4 to 12 pH units		



### Sensors

Parameters	1 TriOxmatic®	2 FDO®	3 Sensolyt®	4 TetraCon®	5 VISO Turb®	6 VISO Solid®	7 NitraVis®	8 CarboVis®	9 NiCa Vis®	10 VARION®	11 AmmoLyt®	12 NitraLyt®	13 IFL
Temperature	•	•	•	•	•	•	•	•	•	•	•	•	
DO (electrochemical)	•												
DO (optical)		•											
pH			•										
ORP			•										
Conductivity				•									
Salinity				•									
Turbidity					•								
TSS						•	•	•	•				
Ammonium										•	•		
Nitrate							•		•	•		•	
Potassium										•	•		
Chloride*										•	•		
COD (chemical oxygen demand)								•	•				
TOC (total organic carbon)								•	•				
BOD (biochemical oxygen demand)								•	•				
DOC (dissolved organic carbon share of TOC)								•	•				
SAC (spectral absorption coefficient)								•	•				
Interface (Sludge) Level Measurement**													•

\*Chloride is used as compensation only and is not a visible parameter on the IQSN system. Please contact us for more information.

\*\* For use with the 2020 XT and MC2 modules.

# System-wide Process Monitoring & Control

## IQ SENSOR NET 2020 XT

### Influent:

pH, Conductivity, Ammonium, COD, TOC, DOC, BOD, SAC

### Aeration:

D.O., Ammonium, Nitrate, TSS, pH





**Effluent:**

Ammonium, Nitrate, pH,  
Conductivity, D.O., Turbidity,  
COD, TOC, DOC, BOD, SAC

**Back-up Terminal**

**Final Settling:**  
Nitrogen, Turbidity, TSS,  
pH, Sludge Blanket Level



# Only WTW

The modular WTW IQ SENSOR NET water quality control system (2020 XT, 182, 182 XT, 182 XT-4) is a complete sensor network for a variety of installation needs. This powerful system lets you easily add more modules or sensors at any time while continuously measuring water quality anywhere in your facility for the ultimate process control. In addition, you receive the exclusive benefits below, as provided only by WTW. Sheer genius.

One cable for power and communication

Terminal connects to any module on network

2-year lightning-strike warranty

3-year warranty, terminals and displays

2-year warranty, sensors

Terminals, modules, and sensors can be placed anywhere in the network

Connect up to 20 sensors

Network scales easily without new hardware or engineering

Smart technology recognizes and displays sensors

Network outputs analog and digital signals



No calibration required on most sensors; automatic drift compensation

Measures DO, conductivity, temperature, pH, ORP (Redox), nitrate, ammonium, potassium, turbidity, TSS, COD, BOD, SAC, DOC, TOC

Optical DO sensor is immune to bubbles in the medium with unique design

Ultrasonic cleaning integrated into turbidity, TSS and UV sensors

# Order Guide

Building a system is easy. Just choose an IQ SENSOR NET terminal, select which modules you'll need, determine your distances for cabling, and select your parameters. And don't forget your accessories. Let's get started.

**Step 1 (terminal)** - the first step is to decide which terminal/controller will be required. Always consider future needs and possible system expansion.

**Model 182 (terminal only)** - maximum 2 sensors with 2 analog (0/4-20 mA) outputs and 3 relays

**Model 182 XT (terminal only)** - maximum 2 sensors with 4 analog (0/4-20 mA) outputs and 5 relays

**Model 182 XT-4 (terminal only)** - maximum 4 sensors with 5 analog (0/4-20 mA) outputs and 6 relays capable of digital output

**Model 2020 XT (terminal only)** - maximum of 20 sensors with multiple analog outputs and relays available; most powerful configurable system

There are also several kits including terminals and modules together.

**Step 2 (modules)** - the next step is dependent on the unique application. The modules fall into 9 general categories. Power Supply, Analog Output, Interface, Magnetic Valve, Radio/Bluetooth, Analog Input, Extension, and Controller modules. Some modules are combined functionality modules.

**Step 3 (cables)** - cable decisions are relatively simple. The application should be understood enough to know distances within the IQ SENSOR NET system.

**SACIQ** - sensor adapter cable; connects to each sensor - specific or special order lengths (in meters) available along with seawater option for highly corrosive applications

**SNCIQ** - sensor network cable; connects modules to other modules and terminals in the network - specific or special order lengths (in meters) available

**Step 4 (sensors)** - it is necessary to know what parameters are required. It may only be a couple parameters at multiple locations or multiple parameters at a couple locations - either way, your requirements will determine which sensors are needed.

**Step 5 (accessories)** - mounting panels, cleaning brushes, calibrations standards and more.

# What can Xylem do for you?

We're 12,500 people unified in a common purpose: creating innovative solutions to meet our world's water needs. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. We move, treat, analyze, and return water to the environment, and we help people use water efficiently, in their homes, buildings, factories and farms. 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, backed by a legacy of innovation.

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



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TriOxmatic, FDO, SensoLyt, TetraCon, VisoTurb, ViSolid,  
NitraVis, CarboVis, NiCaVis, VARIION, AmmoLyt, NitraLyt  
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