HACH®
Be Right™

Waste Water Solutions



ENSURE WATER
QUALITY
FOR PEOPLE AROUND
THE WORLD

ASIS SCIENTIFIC

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ABOUT HACH

Since 1947, Hach Company has manufactured and distributed analytical instruments, test kits, and reagents for testing the quality of water and other liquid solutions for lab, process, and field. For more than 60 years, we've been at the crest of the industry - finding solutions that help you best manage your water. Our analytical instruments and reagents are used to test the quality of water in a variety of industries and markets - from around the corner, to around the globe.

Due to overwhelming demand from Southeast Asia region customers, and expansion of the water industry in the Southeast Asia region:

- Hach implemented local strategies to set up Southeast Asia regional headquarters in Singapore since 2005.
- Headquarters in Singapore was gradually used as a base to expand our business presence in the high growth Southeast Asia region.



Hach Southeast Asia HQ - Singapore

- Resulted in our company's strong positioning today, thanks to the strong partnerships Hach had for 10 years of continuous development in the Southeast Asia region.

With our positioning in the Southeast Asia region, Hach has built strong partnerships in this industry. Being the leader in solutions provider for water quality, Hach has masses of cases to share, for example;

In Singapore Changi, one of the largest and most advanced reclamation facilities in the world, wastewater plant has adopted Hach's all-round solutions to fulfill stricter discharge contents while reducing costs.

Apart from that, in Long Hau, Vietnam, a client with one of the largest wastewater treatment plant in a centralized industrial park, embraced on Hach's tailor-made versatile solution to ensure their process control and effluent compliant to regulation.


Hach Company - USA

Hach has also proposed to the first private industrial park wastewater treatment plant in Bangkadi, Thailand with client gladly espousing Hach's comprehensive solution to assure compliance with effluent requirements.

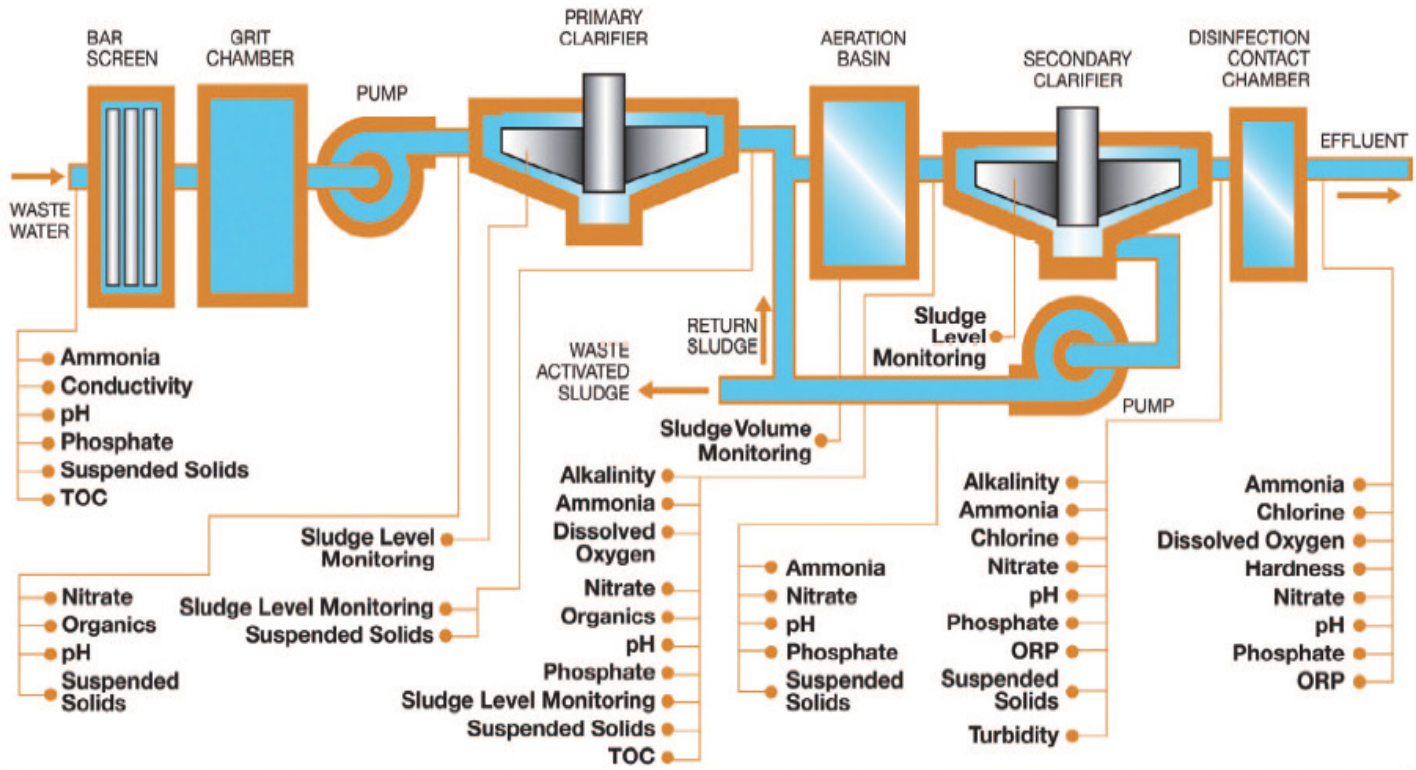
Wastewater treatment is the one of the only process in the world where you can't control your inputs, but have to make a perfectly controlled output. For a perfectly controlled output, monitoring is an important process.

Hach SEA is your ultimate choice for wastewater treatment process analytical solution which are designed and manufactured to the highest quality standards for guaranteed performance, driving your water business to a greater level.

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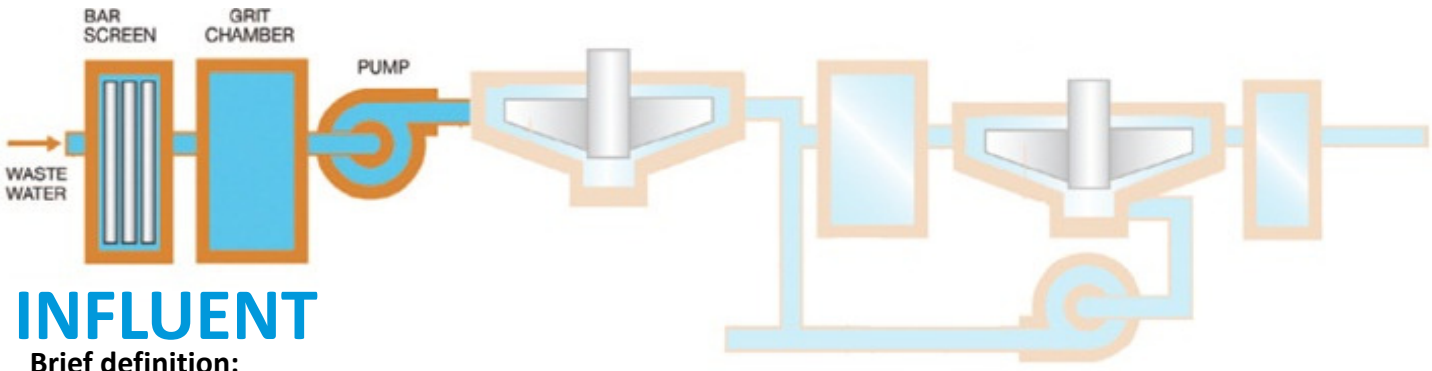
WASTE WATER TREATMENT FLOW

Waste Water Treatment Flow Diagram



Parameters	Collection System	Influent	Primary Sedimentation Tank	Aeration Tank	Secondary Sedimentation Tank	Tertiary Treatment	Disinfection	Nutrients Removal	Digestion Tank	Sludge	Effluent	Online Analyzers & Instruments	Laboratory and Portable Instruments	Test Kits
Alkalinity		•	•	•	•			•		•	•		•	•
Ammonia		•	•	•	•	•	•	•			•	•	•	•
BOD		•		•							•		•	
Chlorine							•				•	•	•	•
COD		•									•	•	•	
Conductivity		•	•	•	•			•			•	•	•	
Dissolved Oxygen	•			•	•	•		•	•	•	•	•	•	
Total Coliform				•	•		•			•	•		•	•
Fecal Coliform				•	•		•			•	•		•	•
Flow Rate	•	•	•	•	•	•	•	•	•	•	•	•		
Hardness		•	•	•	•			•		•	•		•	•
Metal	•			•				•			•		•	•
Nitrate				•	•	•		•			•	•	•	•
Nitrite													•	
Nitrogen				•	•	•		•			•		•	
Organics		•		•	•	•					•	•		
ORP	•		•	•		•	•	•	•		•	•	•	
Ozone						•	•					•	•	•
pH	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Phosphates								•				•	•	
Total Phosphorous											•		•	•
Suspended Solids	•	•	•	•	•	•		•	•	•	•	•	•	
Turbidity		•		•	•	•					•	•	•	

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INFLUENT

Brief definition:

- Waters that are discharged into sanitary waste system are delivered to water pollution control plant (WPCP) through dedicated collection system commonly referred to as the "sewer" system. For our purposes, we will refer to the sewer system as a collection.
- Plant operators find themselves in a difficult situation: Know exactly what quality of plants' effluent must be, yet have very little control over contents of their plants' influent. Operators must simply deal with whatever the collection system brings them.



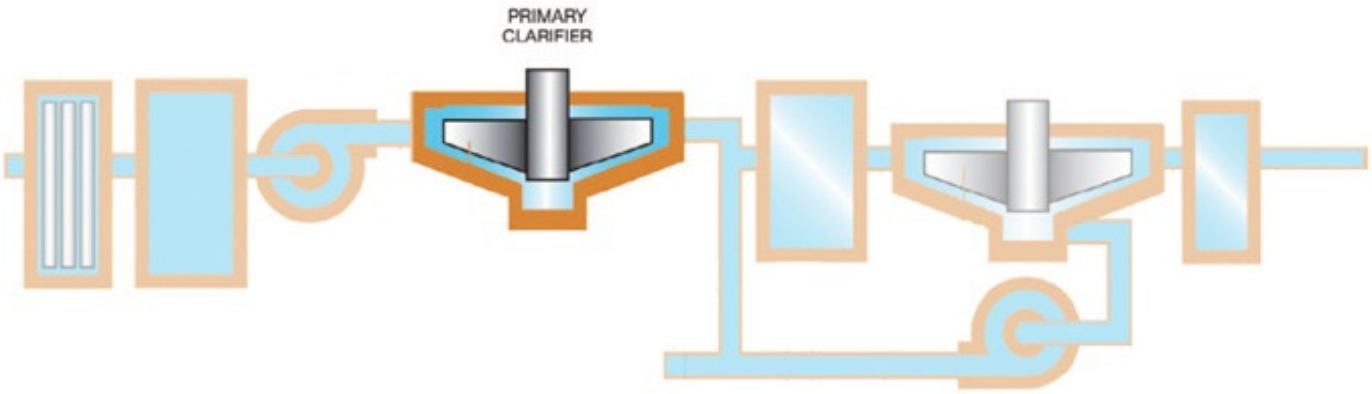
Online monitoring of influent

With continuous monitoring, you can:

- ✓ Understand characteristics of wastewater influent.
- ✓ Determine load and define if plant capacity can take up task of treating incoming sewage.

Specific solutions from Hach:

Parameter	Process Solution	Lab Solution	Purpose	Location	No. of Units Required
Flow	AV9000		Incoming plant sewage load	Plant head works	1
	Ultrasonic				
	Sigma 950				
	Flo-Dar				
Ammonia	Amtax sc	DR6000/DR3900/DR1900	Incoming ammonia load, determine C/N/P ratio	Pre-treatment effluent	1
	AISE sc	DR900			
Phosphate	Phosphax sc	DR6000/DR3900/DR1900	Incoming phosphate load, determine C/N/P ratio	Pre-treatment effluent	1
		DR900			
pH	DPD1P1	HQ11D	Incoming pH value	Pre-treatment effluent	1
		sensION+			
Conductivity	D3700		Incoming dissolved salts load	Pre-treatment effluent	1
Organics	CODmax		Incoming organics load	Pre-treatment effluent	1
	Biotector				
	astroTOC				
	UVAS sc				
Suspended Solids	Solitax sc	TSS Portable	Incoming suspended solids load	Pre-treatment effluent	1
	TSS sc				
Automatic Sampler	Sigma SD900		Collection of samples to be sent for lab testing	Pre-treatment effluent	1
Oil and Grease	FP360 sc Oil in Water Sensor		Prevent killing microorganism in next biological treatment process or receiving	Primary clarifier	1



PRIMARY CLARIFIER

Brief definition:

- Many times operators often underestimate how much impact primary treatment can have, on the secondary biological portion of the system.
- Whole purpose of primary treatment is to physically remove as much loading from the system as quickly, and as cheaply as possibly without high tech equipment or excessive monitor and control. Often times, small adjustment to the equipment can significantly improve solids removal, as well as BOD and TSS removal, or even prevent the growth of filamentous bacteria in the biological portion.
- Concentration of solids - The larger and heavier the suspended solids, the faster they will settle. The more particles there are (within design), the better the settling.



Preliminary Clarifier in Wastewater Plant

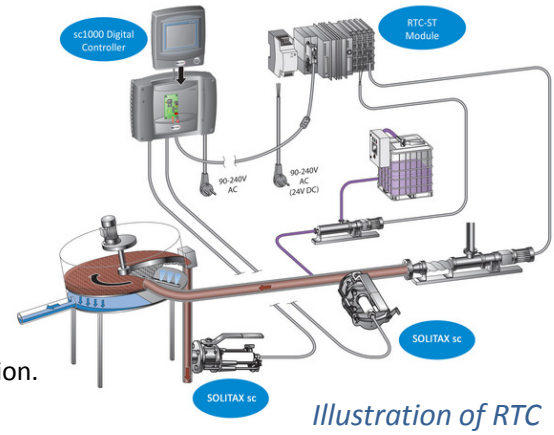


Illustration of RTC

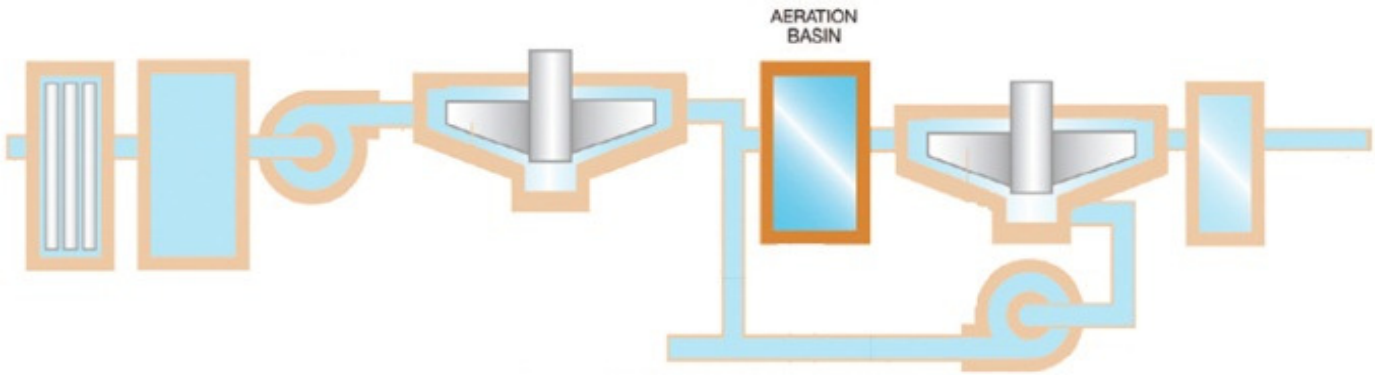
With continuous monitoring, you can:

- ✓ Ensure wastewater plant performance is optimized.
- ✓ Achieve better performance in even the most challenging application.
- ✓ Reduce maintenance cost by reducing run time.

Specific solutions from Hach:

Parameter	Process Solution	Lab Solution	Purpose	Location	No. of Units Required
Sludge Level	Sonatax sc	TSS Portable	Control sludge discharge	Primary Clarifier	1 per clarifier
	RTC113-ST				
Sludge Concentration	Solitax sc	TSS Portable	Control sludge discharge	Primary Clarifier	1 per sludge discharge line
	TSS sc				
Oil and Grease	FP360 sc Oil in Water Sensor		Prevent killing microorganism in next biological treatment process or receiving	Primary clarifier	1

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BIOLOGICAL TREATMENT BASIN

Brief definition:

- Aeration can be 50% of a plant's budget because most wastewater treatment plants play it safe by running their blowers full speed, 24 hours a day, 7 days a week.
- Knowing your Nitrate and Ammonia levels with seasonal or daily fluctuations is critical to save you money by knowing when to turn off the blowers.
- Nitrogen enters wastewater treatment plants mainly as Ammonia and is typically removed biologically. Utilizing aeration, the nitrification stage utilizes aerobic bacteria to turn Ammonia into Nitrite and then Nitrate. Nitrogen removal happens in the denitrification stage as bacteria consume the Oxygen from Nitrate turning it into Nitrogen gas that escapes into the atmosphere.
- Oxygen is introduced into wastewater along with microorganisms to develop a biological floc, which reduces the organic content of the wastewater.



Aeration Basin



LDO probes installed on customer's site at the aeration basin

With continuous monitoring, you can:

- ✓ Save up on your energy costs and see the return on investment in the same year.
- ✓ Respond to rapid increases in plant load.
- ✓ Achieve automatic control of blower speed and and further reduce energy costs.
- ✓ Testing and monitoring the accurate amount of dissolved oxygen in aeration basin.
- ✓ Determine what biological reaction is occurring and if operational conditions should be changed to promote or prevent that reaction.
- ✓ To continuously monitor dissolved oxygen, Hach's controller can alert staff immediately of any changes in dissolved oxygen levels, and can be integrated with a variable frequency drive or PLC system to control the amount of oxygen injected into the system.

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BIOLOGICAL TREATMENT BASIN

Three zones for the A2O process:

- ✓ **Anaerobic Zone**
- ✓ Anoxic Zone
- ✓ Aerobic Zone

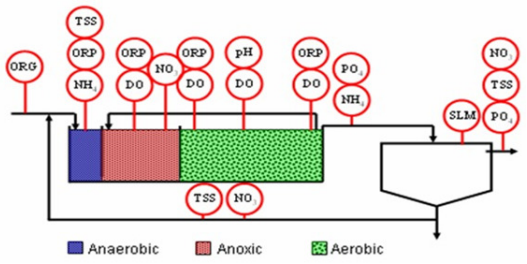


Illustration of biological treatment basin

Brief definition:

- ❖ In an A2O process, Polyphosphate Accumulating Organisms (PAOs) are bacteria which can perform different functions in different environment. In the anaerobic, the PAOs break down stored intracellular polyphosphate into simple orthophosphate and release it into the water as they consume Volatile Fatty Acids (VFAs) and convert them to polyphydroxyalkanoates (PHAs).

- ❖ This is the segment where the PAOs will release phosphorus nutrients into the water and cause a "starving" effect. They will later, in the right conditions, go into a "luxury uptake" mode, where they will take in more phosphorus than they initially release.



Anaerobic zone in wastewater plant

With continuous monitoring, you can:

- ✓ Determine the absence of oxidants (oxygen and nitrate).
- ✓ Determine load into the secondary treatment basin and C:N:P ratio for ammonia and organics.
- ✓ Coupled with other suspended solids around the secondary treatment basin, measurement is done to determine sludge age.

Specific solutions from Hach:

Parameter	Process Solutions	Lab Solutions	Purpose	Location	No. of Units Required
Ammonia	Amtax sc AISE sc	DR6000/ DR3900/ DR1900 DR900	Determine load into secondary treatment basin, C:N:P ratio and determine nitrogen removal efficiency	Anaerobic Basin	1
Organics	CODmax Biotector astroTOC UVAS sc		Determine C:N:P ratio	Secondary treatment basin influent	1
ORP	DRD1P5	HQ11D sensION+	Determine condition of anaerobic zone	Anaerobic Basin	1
Suspended Solids	Solitax sc TSS sc	TSS Portable	Determine SRT	Anaerobic Basin	1

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BIOLOGICAL TREATMENT BASIN

Three zones for the A2O process:

✓ Anaerobic Zone
✓ **Anoxic Zone**
✓ Aerobic Zone

Brief definition:

❖ The objective of the anoxic zone is to carry out the de-nitrification process, where the nitrate generated in the aerobic zone returns to the anoxic zone via the mixed liquor recycle (MLR) line.

❖ The nitrate is converted to nitrites and ultimately into nitrogen gas under anoxic conditions.

❖ The anoxic zone generally contains small amounts of dissolved oxygen, so in order to respire; the Pseudomonas species bacteria are forced to remove the oxygen from the nitrate molecule, turning it into nitrogen gas.



Anoxic zone in wastewater plant

With continuous monitoring, you can:

- ✓ Ascertain anoxic conditions (correlation with nitrate content), typically between – 100 to 100 mV.
- ✓ To ensure dissolved oxygen proper de-nitrification, which is typically between 0.2 – 0.5 ppm.
- ✓ Directly control MLR to maintain balance between nitrification and de-nitrification process.

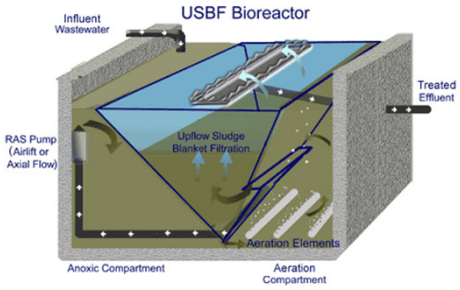


Illustration of anoxic zone

Specific solutions from Hach:

Parameter	Process Solutions	Lab Solutions	Purpose	Location	No. of Units Required
DO	LDO2	LDO	Ensuring proper de-nitrification	Anoxic Basin	1
Nitrate	Nitratax sc	DR6000/DR3900 /DR1900	Control MLR	Anoxic Basin	1
	NISE sc				
		DR900			
ORP	DRD1P5	HQ11D	Ascertain anoxic conditions	Anoxic Basin	1
		sensION+			



LDO 2 Sensor



Nitratax sc Sensor



DR1900



DR900



HQ11D

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BIOLOGICAL TREATMENT BASIN

Three zones for the A2O process:

✓ Anaerobic Zone
✓ Anoxic Zone
✓ **Aerobic Zone**

Brief definition:

- The aerobic zone in the A2O basin is where most of the biological activity is taking place. This is the zone where most of the dissolved organics are being removed.
- The activated sludge will consume the organics in the presence of oxygen where carbon dioxide will be produced. Nitrification process also takes place in the aeration zone where ammonia is first converted to nitrites by the Nitrosomonas bacteria.
- Nitrites are then converted into nitrates by Nitrobacter bacteria. Both of these biological processes consume oxygen. PAOs function differently when they are introduced into an aerobic condition. PAOs would break down the stored PHAs and consume phosphorus.



Typical wastewater plant

With continuous monitoring, you can:

- ✓ Monitor DO concentration in aerobic initial zone, to ensure proper aeration control.
- ✓ Monitor bio-floc activity in aerobic initial zone, to prevent filamentous bulking and taper aeration control at end of aerobic zone.
- ✓ Monitor for large pH swings to indicate for insufficient alkalinity.
- ✓ Monitor for upset with nitrification and de-nitrification process while determining nitrogen removal efficiency.

Specific solutions from Hach:

Parameter	Process Solutions	Lab Solutions	Purpose	Location	No. of units required
DO	LDO2	LDO	Aeration control	Aerobic basin	3
ORP	DRD1P5	HQ11D	Bio-floc activity	Aerobic basin	2
		sensION+			
pH	DPD1P1	HQ11D	Monitor for aerobic environment	Aerobic basin	1
		sensION+			
Phosphate	Phosphax sc		Monitor upset of Bio-P removal	A2O Effluent	1
Ammonia	Amtax sc	DR6000/DR3900 /DR1900	Bio-N removal efficiency & monitor for upset	A2O Effluent	1
	AISE sc	DR900			



Phosphax sc

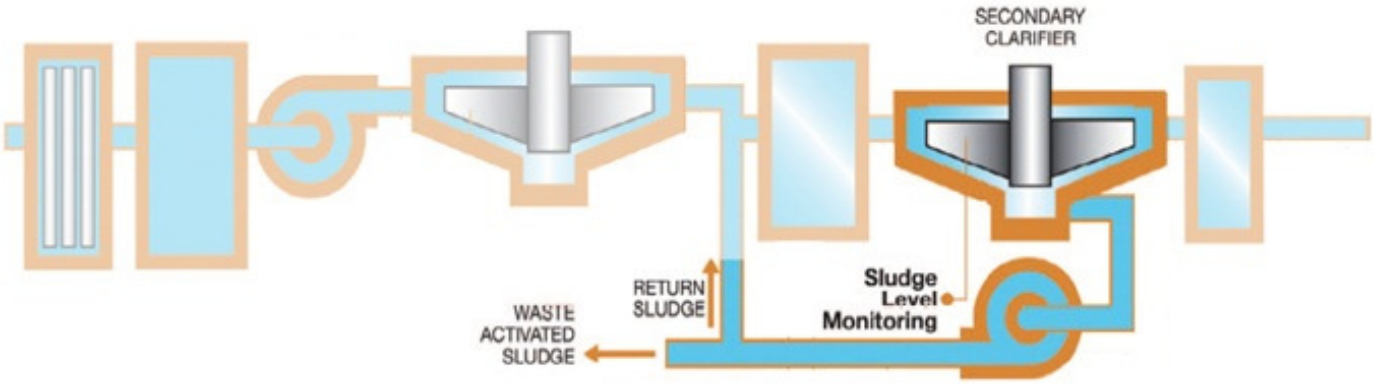


HQ11D



LDO Probe

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SECONDARY CLARIFIER

Brief definition:

- The objective of the secondary clarifier is to separate treated wastewater and activated sludge.
- A portion of the settled sludge will be recycled back via the RAS line into the A2O basin, to maintain an appropriate sludge retention time (SRT) or sludge age and the other portion will be sent for solids management and disposal via the WAS line.
- It is recommended to have a sludge blanket analyzer in the secondary clarifier and, a TSS and nitrate measurement on the RAS line.



Secondary Clarifier

With continuous monitoring, you can:

- ✓ Determine sludge inventory in the secondary clarifier and to control sludge removal.
- ✓ Monitor and control of TSS measurements for effluent of secondary clarifier.
- ✓ Indicate if too much nitrates are being recycled into anaerobic zone as if inhibits phosphorus release on the RAS line.

Specific solutions from Hach:

Parameter	Process Solution	Lab Solution	Purpose	Location	No. of units required
Sludge level	Sonatax sc		Sludge inventory	In secondary clarifier	1
Suspended Solids	Solitax sc	TSS Portable	Determine SRT	RAS & secondary clarifier effluent	2
	TSS sc				
Nitrate	Nitratax sc		Monitor recycled and effluent nitrate	RAS & secondary clarifier effluent	2
	NISE sc				
Phosphate	Phosphax sc		Monitor effluent phosphate, determine phosphorus removal efficiency	Secondary clarifier effluent	1

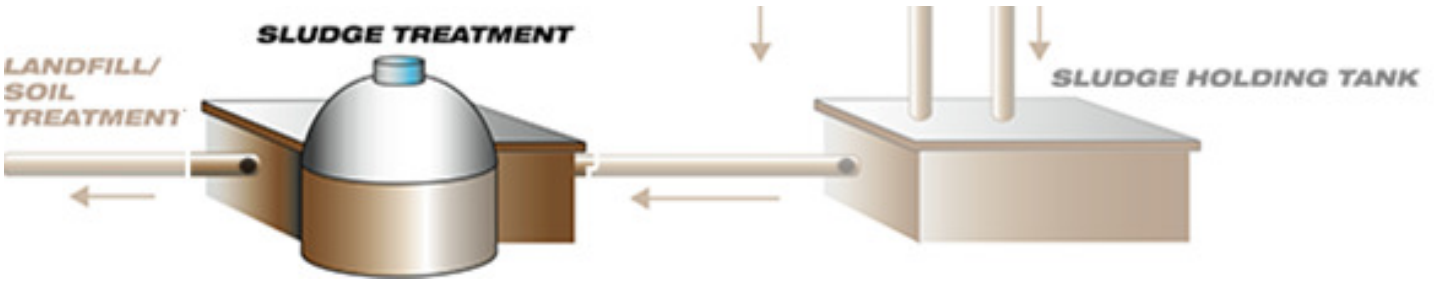


Nitratax sc Sensor



TSS Portable

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SOLIDS MANAGEMENT

Sludge Thickening

- Recommended that suspended solids be measured at feed sludge and filtrate or retentate of sludge thickening device (e.g. settling basin or Dissolved Air Flotation [DAF]).
- Thicken sludge or filtrate TSS concentration is used as feedback control loop which trims chemical flow in order to maintain thickened sludge at defined set point.
- Typically, chemical is dosed to DAF based on flow rate, but dosing based on flow ignores one major factor: the solids concentration! This leads to under and overdosing which could waste chemicals, increase hauling costs, and result in fines.



Dissolved Air Flotation Optimization



Optimise efficiency of Anaerobic Digester

Anaerobic Digester

- Microbial population in anaerobic digesters are very complexed. Physicochemical parameters values in bioreactor drives the metabolic pathways, kinetics, and microbial diversity.
- Organic loading rate should adapt to treatment capacity of system, for better process operations.

Sludge Dewatering

- Several factors determine efficiency of dewatering process. The type and amount of flocculent used, the dry mass (flow multipled by solids concentration), and the nature of the sludge itself.
- Since flocculent dosage requirements are constantly changing, it is easy to see advantage of continuously measuring the suspended solids entering this stage.
- Continuous measurement minimizes flocculent costs and increase energy recovery by insuring that sludge contains minimum amount of water.
- Sludge dewatering would require a suspended solids and ammonia measurement before feeding to a dewatering device (e.g. belt press, centrifuge).



Sludge dewatering – Belt presses

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SOLIDS MANAGEMENT

With continuous monitoring, you can:

- ✓ Chemical cost-savings and control of polymer dose to DAF.
- ✓ Control sludge fed to the anaerobic digester at about 4.5 – 5 % to avoid creating "sour" digester or foaming within digester.
- ✓ Detect occurrence of "sour digester" and perform cleaning to digester.
- ✓ Control polymer feed to dewatering device for feed forward control loop of recycling supernatant.
- ✓ Control recycle of supernatant from dewatering process to plant head works so as not to overload system.

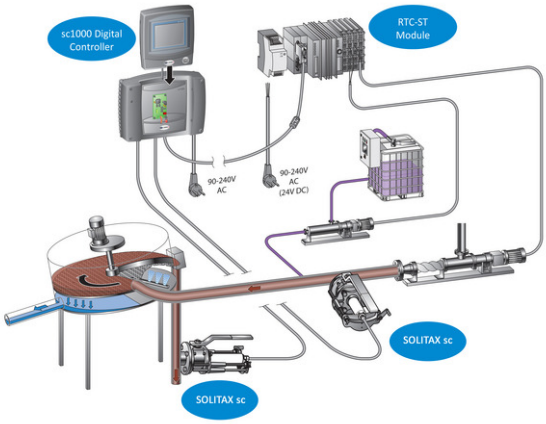


Illustration of Solids management by monitoring

Specific solutions from Hach:

Parameter	Process Solution	Lab Solution	Purpose	Location	No. of Units Required
Suspended Solids	Solitax sc TSS sc	TSS Portable	Control polymer dose & sludge concentration to anaerobic digester	Sludge Thickening – DAF feed and filtrate	2
pH	DPD1P1	HQ11D sensION+	Monitor for sour conditions	Anaerobic Digester	1
Suspended Solids	Solitax sc TSS sc	TSS Portable	Polymer feed control	Dewatering Influent	1
Ammonia	Amtax sc	DR6000/DR3900/ DR1900 DR900	Control recycling of supernatant	Dewatering Influent	1



DR6000



DR1900



pH Differential Sensor



DR900



Solitax sc



Amtax sc



HQ11D



TSS Portable



DR3900

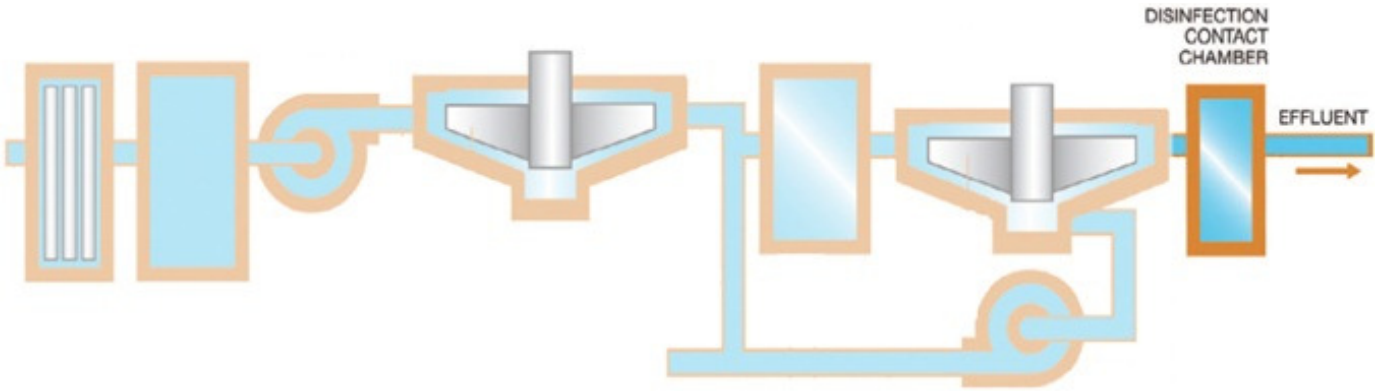


TSS sc Sensor



sensION+

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TREATED EFFLUENT

Brief definition:

- ❖ Effluents affect environment, health, and demand constant monitoring and control. Cleaner waste water discharges to both sewer and watercourses and can be achieved by systems that monitor, treat and remove effluents prior to discharge.



Monitoring effluents

With continuous monitoring, you can:

- ✓ Conduct continuous effluent monitoring to ensure effluent levels in discharged water is within regulatory levels and any problems would be identified immediately.
- ✓ Identify unacceptable conditions that may occur immediately.

Specific solutions from Hach:

Parameter	Process Solution	Lab Solution	Purpose	Location	No. of units required
Ammonia	Amtax sc	DR6000/DR3900/DR1900	Effluent ammonia	Plant effluent	1
Organics	CODmax		Effluent organics content	Plant effluent	1
	Biotector				
	astroTOC				
	UVAS sc				
Nitrate	Nitratax sc	DR6000/DR3900/DR1900	Effluent nitrate	Plant effluent	1
Phosphate	Phosphax sc	DR6000/DR3900/DR1900	Effluent phosphate	Plant effluent	1
pH	DPD1P1	HQ11D	Effluent pH	Plant effluent	1
		sensION+		Plant effluent	1
DO	LDO2	LDO	Effluent DO	Plant effluent	1
Conductivity	D3700		Effluent conductivity	Plant effluent	1
Suspended Solids	Solitax sc	TSS Portable	Effluent suspended solids	Plant effluent	1
	TSS sc				
Automatic Sampler	Sigma SD900		Collect samples to be sent for laboratory test	Plant effluent	1
Oil and Grease	FP360sc		Prevent killing microorganism in next biological treatment process or receiving	Plant effluent	1

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MEMBRANE BIOREACTOR (MBR)

Brief definition:

- The usage of membrane bioreactors increases as stringent effluent water quality requirements, space constraints and consistent effluent water quality capabilities grows.
- Use of membrane technology allows treatment system to operate at much higher concentration of activated sludge in the reactor tank *(sludge concentration can be as high as 15,000 mg/l, as compared to conventional process which typically operate at 3 - 4,000 mg/l)*.



Client's treatment plant installed with membrane bioreactor technology

With continuous monitoring, you can:

- ✓ Reduce energy and operating costs that is being consumed, significantly.
- ✓ Productivity boosted with the membrane bioreactor.
- ✓ Ability to lower your footprint while offering a flexible design.

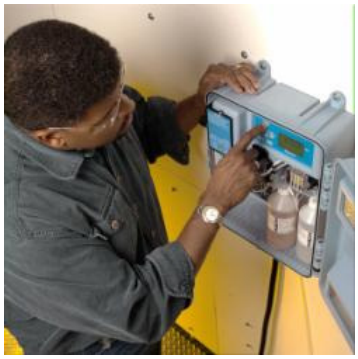
Specific solutions from Hach:

Parameter	Process Solution	Lab Solution	Purpose	Location	No. of Units Required
Organics	CODmax		MBR effluent organics content and determine MBR efficiency	MBR Effluent	1
	Biotector				
	astroTOC				
	UVAS sc				
DO	LDO2	LDO	MBR DO content	MBR Tank	1
Ammonia	Amtax sc	DR6000/DR3900 /DR1900	MBR effluent ammonia	MBR Effluent	1
		DR900			
Nitrate	Nitratax sc	DR6000/DR3900 /DR1900	MBR effluent ammonia & nitrate recycle	MBR Effluent, MBR Recycle and Anaerobic Recyle	3
		DR900			
pH	DPD1P1	HQ11D	Monitor MBR tank environment	MBR Tank	1
		sensION+			
ORP	DRD1P5	HQ11D	Determine condition of MBR tank	MBR Tank	1
		sensION+			
Phosphate	Phosphax sc		MBR effluent phosphate	MBR Effluent	1
Suspended Solids	Solitax sc	TSS Portable	Determine SRT	MBR Tank, MBR Recycle and Anaerobic Recycle	3
	TSS sc				

ADVANCED TREATMENT

Chlorine Disinfection

- Various control strategies are employed to ensure sufficient amount of chlorine has been applied to wastewater effluent to achieve desired disinfection goals.
- Commonly used control strategies, such as Feed Back / Compound Loop Control, combination of effluent flow rate, chlorine flow rate and chlorine residual are measured for dosing control with chlorine residual used as set point parameter.



Chlorine disinfection with assistance of Hach Chlorine Analyzer CL17.

With continuous monitoring, you can:

- ✓ Control amount of chlorine used.
- ✓ Monitor chlorine concentration to ensure micro-organisms are inactivated.
- ✓ Monitor amount of chlorine present in effluent of chlorine contact basin.

Parameter	Solution	Purpose	Location	No. of Units Required
Chlorine	CL17 CL10	Control chlorine dosing and effluent chlorine	Chlorine contact basin influent and effluent	2

Chemical Phosphorus Removal:

- Converted from soluble form to particulate form for removal. Chemical Phosphorus removal uses Iron or Aluminum compounds to combine with and precipitate out Phosphate.
- Biological phosphorus removal is usually incorporated into wastewater secondary treatment process.
- Chemical phosphorus precipitation is sometimes combined with secondary treatment process, if secondary treatment process is still unable to reduce phosphorus nutrient content to meet discharge requirements.
- Typically in Chemical Phosphorus removal, the flow weighted average Phosphate is used to set a static dose.



Chemical Phosphorus Removal at client's site

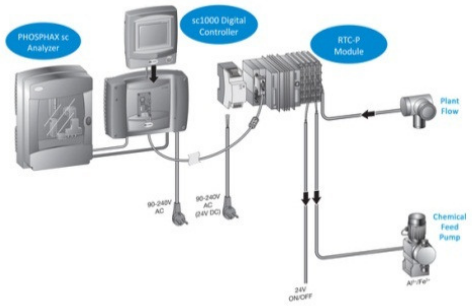
With continuous monitoring, you can:

- ✓ Prevent over and under dosing, which could a waste of money.
- ✓ Avoid causing a permit violation.
- ✓ Control dosing can significantly reduce cost of Chemical Phosphorus removal.

Parameter	Solution	Purpose
Phosphate (Phosphorus Removal System)	RTC-P System	Monitor or control chemical addition/efficiency of removal system and monitor Biological Phosphorus Removal system

REAL TIME CONTROL SYSTEM (RTC)

Hach provides off-the-shelf Real Time Control (RTC) module for optimization of chemical feed for phosphorus removal. RTC module coupled with phosphate analyzer is able to control dosing of coagulant, usually Ferric Chloride, based on a phosphate set point. With more than 125 locations done around the world, it is shown to be able to reduce chemical usage between 10-60%.



- ❖ Adjust treatment processes in real time
- ❖ Keep facility compliant
- ❖ Reduce treatment costs

With the RTC system, you can:

- ✓ Maintain consistent effluent phosphorus values.
- ✓ Enhance chemical phosphorus control system.
- ✓ Optimize chemical phosphorus removal by adjusting chemical dosing in real time through continuous measurement of phosphate concentration and flow.

Solution	Description	Benefit
RTC-N/DN System	Open and closed loop control unit for load dependent setting of nitrification and denitrification times	• Reliable compliance with nitrogen effluent values with optimal energy use due to exact, load dependent aeration • Based on verified ammonium and nitrate values • Optionally equipped with additional closed loop controller for setting dissolved oxygen concentration in aeration tank.
RTC-N System	Open and closed loop control unit for the ammonium load dependent setting of oxygen concentration	• Reliable compliance with nitrogen effluent values with optimal energy use due to exact, load dependent aeration • Based on verified ammonium values • Optionally equipped with an additional closed loop controllerfor setting the dissolved oxygen concentration in the aeration tank.
RTC-P System	Open and closed loop control unit for load dependent, chemical phosphate elimination based on flow volume and orthophosphate concentration	• Reliable compliance with phosphate effluent values with sparing use of precipitants via precise, load dependent dosage • Used for both open and closed loop control of precipitant dosage. Depending on the situation, it observes current measurement values or retrieves stored hydrographs.
RTC-ST and RTC-SD Systems	Open and closed loop control unit for optimisation of polymer dosage in mechanical sludge thickening and dewatering	• Reliable compliance with required dry matter content in the thickened sludge and dewatered sludge due to load dependent polymer dosage and adjustment of influent volume
RTC-SRT System	Open and closed loop control unit for setting the sludge age depending on the temperature and wastewater load	• Reliable compliance with required sludge age based on verified measurement values • Automatic setting of the optimal sludge age depending on the load and the temperature

FEATURED PRODUCTS - LAB

DR 6000™ UV VIS Spectrophotometer



- Your water testing needs, all in one spectrophotometer
- More than 250 kinds of built-in water quality parameters for test method application
- Time-saving automatic method detection and superior accuracy
- High-speed wavelength scanning across the UV and visible spectrum
- Wavelength accuracy: ± 1nm in wavelength range 190 ~ 1100 nm
- Wavelength resolution: 0.1 nm

DR 3900 Benchtop Spectrophotometer



- Consistently accurate results in simpler testing format
- Built-in applications over 250 kinds of water quality test methods
- Elimination of false readings
- Reading mode: transmittance (%), absorbance and concentration
- Wavelength accuracy: ± 1.5 nm (wavelength range 370 ~ 1100 nm)
- Wavelength range: 320 ~ 1100 nm

DR 1900 VIS Spectrophotometer



- Combines ruggedness and portability of field instrument with over 220 of most commonly tested water methods
- Ensure accuracy in the field with wavelength range of 340-800nm.
- Carry more water methods wherever you need them most
- Water protection is IP67 (water proof)
- Wavelength resolution: 1 nm

DR 900 Multiparameter Handheld Colorimeter



- Fastest and simplest water testing for the most demanding field environments
- Satisfies your core testing needs
- Field ready in every way possible
- Waterproof, dustproof and field durable
- Ability to test up to 90 methods
- Intuitive user interface
- USB data transfer is available
- Wavelength range: 420 nm, 520 nm, 560 nm, 610 nm

DRB200 Digital Reactor



- Provides one-key operation that's unique and fast
- Block heats from 20 to 150°C in less than 10 minutes
- Fully insulated heater block with no skin contact
- Accommodates most test vials
- Select dual block model for simultaneous digestions

Pocket Colorimeter™ II



- Measures one or two parameters, with 30 possible parameters available for selection
- Testing includes oxygen, nitrogen dioxide, ozone and etc.,
- Instrument is easily operated and user friendly
- Waterproof, lightweight, rugged and convenient
- Backlit display, data logging, recall
- Wavelength accuracy: Fixed wavelength, ± 2 nm

2100AN / 2100N Lab Turbidimeter



- Ratio technology provides highly accurate results
- Optional cell adapters allow measurements of smaller sample volumes
- Air purge prevents condensation in the sample chamber
- 2100AN comes with built-in printer that provides record of calibration and measurement data
- Accuracy: ±2 % of reading plus 0.01 NTU from 0 ~ 1000 NTU, ±5% of reading from 1000 to 4000 NTU

2100Q Portable Turbidimeter



- Easy on-screen assisted calibration and verification
- Accurate for rapidly settling samples
- Convenient data logging
- Optical system for precision in the field
- Resolution: 0.01 NTU (FNU) on lowest range
- Measurement range: 0 ~ 1000 NTU

HACH®
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FEATURED PRODUCTS - LAB

HQD Portable Multi-Parameter Meter



- Intuitive user interface for simple operation and accurate results
- One or two input channels for simultaneous measurement of pH, conductivity, dissolved oxygen, BOD, ORP, ammonia, ammonium, fluoride, chloride, sodium, and temperature
- Designed for demanding conditions; rugged, waterproof (IP67) meter

HQD Benchtop Multi-Parameter Meter



- Flexible benchtop meter makes lab testing of critical water quality parameters more efficient
- One or two input channels for simultaneous measurement of pH, conductivity, dissolved oxygen, BOD, ORP, ammonia, ammonium, fluoride, chloride, sodium, and temperature
- Enhance productivity with an ultra-bright screen and large font size to read results easily
- Internal USB ports simplify data transfer, peripherals

sensION+ Benchtop / Portable Series



- Determine multiple parameters (pH, ORP, conductivity, TDS, salinity, ISE) in the field
- Low maintenance design for a variety of applications
- The portable series is ultra-portable but protected against harsh field conditions
- The benchtop series' system is designed to be used in a wide variety of applications and comes complete with everything you need to start testing.
- Provides simple and fast measurements

IntelliCAL™ LDO Probe



- A revolutionary breakthrough in measurement of dissolved oxygen, eliminating numerous reliability and maintenance concerns inherent of older DO measurement technologies.
- Provide ultimate traceability in measurement history
- Moving between meters without the need to re-calibrate or re-enter measurement settings is now possible with IntelliCAL™
- Measurement range: 0.05 ~ 20.00 mg/L

BODTrak II



- Simplify BOD analysis and decreases the total test time
- Greaseless bottle seal, large graphical display and small footprint
- BOD results are made easier to monitor with the large graphic display that continuously update results
- Constant stirring in the bottles supplier additional oxygen to sample, this is faster than dilution method
- The BODTrak II can fit six of 492mL bottles

TSS Portable Hand-held Turbidity



- Three parameters in one instrument, includes turbidity, suspended solids, and sludge blanket level
- Multiple calibration curves for convenience
- Easy sludge blanket levels
- Air bubble compensation for accuracy
- Measurement range (TSS Content): 0.001 ~ 400g/L
- Measurement range (Turbidity): 0.001 ~ 9999 FNU

FEATURED PRODUCTS – REAGENTS

Traditional test methods can be time consuming and risk the accuracy of your result. Save time and gain confidence in your results with HACH's pre-packaged reagent.

The following table lists available tests and overall ranges for the Hach spectrophotometer together with HACH reagent. The ranges may represent more than one available test for the instrument.



Parameter	Range	TNTplus Test
Alachlor	0.1 to 0.5 ppb, threshold	
Alkalinity, Total	25 to 400 mg/L	•
Aluminum	0.002 to 0.800 mg/L	•
Ammonia, Nitrogen	0.015 to 50.0 mg/L	•
Arsenic	0.020 to 0.200 mg/L	
Atrazine	0.5 to 3.0 ppb, threshold	
Barium	2 to 100 mg/L	
Benzotriazole	1.0 to 16.0 mg/L	
Boron	0.2 to 14.0 mg/L	
Bromine	0.05 to 4.50 mg/L	
Cadmium	7 µg/L to 0.30 mg/L	•
Carbohydrazide	5 to 600 µg/L	
Chloramine, Mono	0.04 to 10.0 mg/L	
Chloride	0.1 to 25.0 mg/L	
Chlorine Dioxide	0.01 to 1000 mg/L	
Chlorine, Free	0.02 to 10.0 mg/L	•
Chlorine, Total	2 µg/L to 10.0 mg/L	•
Chromium, Hexavalent	0.010 to 1.00 mg/L	•
Chromium, Total	0.01 to 0.70 mg/L	•
Cobalt	0.01 to 2.00 mg/L	
Color	3 to 500 units	
COD (Chemical Oxygen Demand)	0.7 to 15,000 mg/L	•
Copper	1 µg/L to 8.0 mg/L	•
Cyanide	0.002 to 0.240 mg/L	
Cyanuric Acd	5 to 50 mg/L	
DEHA (Diethylhydroxylamine)	3 to 450 µg/L	
Dissolved Oxygen	6 µg/L to 40 mg/L	
Erythorbic Acid (Isoascorbic acid)	13 to 1500 µg/L	
Fluoride	0.02 to 2.00 mg/L	
Formaldehyde	3 to 500 µg/L	
Hardness, Total (Calcium and Magnesium as $CaCO_3$)	4 µg/L to 4.00 mg/L	
Hydrazine	4 to 600 µg/L	
Hydroquinone	9 to 1000 µg/L	
Iodine	0.07 to 7.00 mg/L	
Iron, Ferrous	0.02 to 3.00 mg/L	
Iron, Total	0.009 to 6.0 mg/L	•

Parameter	Range	TNTplus Test
Lead	3 µg/L to 2.0 mg/L	•
Manganese	0.006 to 20.0 mg/L	
Mercury	0.1 to 2.5 µg/L	
Mathylethylketoxime (MEKO)	15 to 1000 µg/L	
Molybdenum, Molybdate	0.02 to 40.0 mg/L	
Nickel	0.006 to 6.0 mg/L	•
Nitrate, Nitrogen	0.01 to 35 mg/L	•
Nitrite, Nitrogen	0.002 to 250 mg/L	•
Nitrogen, Simplified Total Kjeldahl	0 to 16 mg/L	•
Nitrogen, Total	0.5 to 150 mg/L	•
Nitrogen, Total Inorganic	0.2 to 25.0 mg/L	
Nitrogen, Total Kjeldahl	1 to 150 mg/L	
Ozone	0.01 to 1.50 mg/L	
PCB (Polychlorinated Biphenyls)	1 to 50 ppm, threshold	
Phenols	0.002 to 0.200 mg/L	
Phosphonates	0.02 to 125.0 mg/L	
Phosphorus, Acid Hydrolyzable	0.06 to 100.0 mg/L	
Phosphorus, Reactive (Orthophosphate)	19 µg/L to 100.0 mg/L	•
Phosphorus, Total	0.06 to 100.0 mg/L	•
Potassium	0.1 to 7.0 mg/L	
Quaternary Ammonium Compounds	0.2 to 5.0 mg/L	
Selenium	0.01 to 1.00 mg/L	
Silica	3 µg/L to 100 mg/L	
Silver	0.005 to 0.700 mg/L	
Sulfate	2 to 900 mg/L	•
Sulfide	5 to 800 µg/L	
Surfactants, Anionic	0.002 to 0.275 mg/L	
Suspended Solids	5 to 750 mg/L	
Tannin and Lignin	0.1 to 9.0 mg/L	
TOC (Total Organic Carbon)	0.3 to 700 mg/L	
Tolyltriazole	1.0 to 20.0 mg/L	
Toxicity	0 to 100% Inhibition	
TTHM (Trihalomethanes, Total)	10 to 600 µg/L	
TPH (Total Petroleum Hydrocarbons)	2 to 200 ppm, threshold	
Volatile Acids	27 to 2800 mg/L	•
Zinc	0.01 to 3.00 mg/L	

FEATURED PRODUCTS – PROCESS

Turbidity / Suspended Solids / Particles

1720E Turbidimeter



- Continuously flowing sample flows through bubble removal system and eliminates significant interference resulting in accuracy
- Maintenance and cleaning is easy
- Connections are simple plug-and-play
- Data collection and display
- Recommended Applications: Drinking, Pure and Industrial Water
- Measurement range: 0.001 ~ 100 NTU

Ultraturb sc



- Use it effectively to monitor conventional filtered water processes
- Uses ratio methodology with detection at 90° and 180° detects sample chamber fouling
- Suitable for low to medium turbidity applications
- Measurement range: 0.0001 ~ 1000 NTU

FilterTrak 660 sc



- Lowest limit of detection in the market
- Sensitivity increased 150 times compared to conventional turbidity meter
- Compatible with Hach multi-Sensor, multi-parameter digital controllers
- Recommended Applications: Drinking and Industrial Water
- Measurement range: 0.0 ~ 5,000 mNTU

Disinfection

CL17 Chlorine Analyzer



- Providing accurate and reliable results
- Monitor water continuously for free or total residual chlorine
- Provides unattended operation for up to 30 days
- Alarm for manual chlorine feed and automatic chlorine feed pump is available in the CL17 analyzer
- Recommended Applications: Drinking Water, Municiple Wastewater and Power
- Measurement range: 0 ~ 5 mg/L free or total residual chlorine

Solitax sc Probe



- Accurate, color-independent measurement
- Self-cleaning wiper prevent erroneous values
- Excellent correlation to laboratory analysis
- Improve overall efficiency of the plant
- 880nm LED infrared light source
- Recommended Applications: Drinking, Waste and Industrial Water

Product Name	T-Line sc	TS-line sc	HS-line sc
Description	Turbidity sensor	Solids and Turbidity	Solids and Turbidity
Range Turbidity Suspended Solids	0.001 ~ 4000 NTU	0.001 ~ 4000NTU 0.001mg/L ~ 50g/L	0.001 ~ 4000NTU 0.001mg/L ~ 500g/L

Dissolved Gas

HACH LDO® Probe



- Calibration not required
- No membranes to be replaced
- No missed cleaning cycles with customizable service indicators
- No drift, 99% accurate LDO technology
- Recommended Applications: Waste, Industrial and Drinking Water
- Measurement range: 0.00 ~ 20.00mg/L (ppm), 0 ~ 200% saturation

TSS sc Probe



- Specially designed sensors for measurement in high hygenic regulatory conditions
- Two parameter in one instrument – Suspended solids and turbidity
- High temperature sensor that withstands temperatures of up to 90°C
- Compromises eight channel measuring system and has a wide measuring range
- Recommended Applications: Industrial water, food and beverage
- Measurement range: Turbidity (TRB) - 0.001 ~ 9,999 FNU, Solids (TS) – 0.001 ~ 500g/L

Sampler

All Weather Refrigerated Sampler System



- Easy to use with intuitive icons and scrolling menus assures easy setup
- Extended pump tubing life reduces maintenance costs and downtime
- Life time of pump tubing is 20,000 cycles compared to only 1,000 cycles on other samplers
- Also available in portable bases sampler version

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FEATURED PRODUCTS – PROCESS

Nutrients & Organics

UVAS sc



- UV absorbance/transmittance sensor
- Determines Spectral Absorption Coefficient at wavelength of 254 nm
- Monitor efficiency of UV disinfection process and requires no usage of reagents
- Recommended Applications: Drinking Water, Wastewater and Industrial Water
- Continuously protect plant treatment processes from high influent organic loads

HACH BioTector TOC Analyzer



- Provides low maintenance
- Self-cleaning technology prevents clogging and sample contamination
- Analyze without filtering; for measuring of clean and dirty water
- Recommended Application: Industrial, Wastewater, Food & Beverage, Pulp & Paper, Pharmaceutical, Mining, Airports and Chemical, Petrochemical, Refining

Echem

pH/ORP: Differential Sensors



- Ideal for aggressive application
- Lower maintenance requirement with replaceable salt bridge
- Built-in preamp or two-wire transmitter
- Complete encapsulation
- Recommended Applications: Drinking, Wastewater, Industrial Water and Power
- Measurement range: pH (0 ~ 14pH) / ORP (-2000 ~ +2000 mV)

Digital Contacting Conductivity Sensor



- Ultimate accuracy from ultra-pure to high conductivity applications
- Resistivity and conductivity measurement capability
- Versatile mounting styles and multiple different sensors
- Recommended Applications: Drinking, Pure Water, Industrial Water
- Measurement range: (Absolute range: 0 ~ 200,000 µS/cm), (Practical range: 0 ~ 200,000 µS/cm), (Resistivity: 0.002 ~ 20 Mohm)

Controllers

sc200 Controller



- Multi-channel controller operates either 1 or 2 sensors reducing inventory holding costs provides maximum versatility.
- Password protected SD card reader offers simple solution for data download and transfer
- Allows use of digital and analog sensors
- One controller gives you numerous communication options

sc1000 Controller



- Color touch-screen display
- Accepts 2~8 sensors or up to 2 analyzers combination
- Additional relays and analog inputs and outputs can be added by networking a second Probe Module or optional DIN-rail communication modules
- Advanced and flexible communication options features additional

Monitoring Panel

Customized panel to have controller with several probes – choose from a number of different parameters. Hach is able to tailor-made the panel to suit your requirements.



Real Time Control System

Off-the-shelf Real Time Control (RTC) module for optimization of chemical feed for phosphorus removal. RTC module coupled with phosphate analyzer is able to control dosing of coagulant, usually Ferric Chloride, based on a phosphate set point.



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FEATURED PRODUCTS – PROCESS

Sonatax sc Probe



- For continuous ultrasonic measurement of sludge blanket level
- Reduced maintenance with innovative wiper design
- Digitized probe, temperature compensation, and position sensor ensure reliability
- Recommended Applications: Wastewater, Industrial Water
- Measurement range: 0.2 to 12m (0.6ft to 40ft.)

CLF10sc/CLT10sc Chlorine Analyzer



- Compatible with Hach's plug and play digital controllers
- No reagent replacement, no waste stream
- Real-time process monitoring and control
- Limit of quantitation: 90ppb (0.090 ppm)
- Recommended Applications: Drinking, Municipal Wastewater, Pure, Industrial Water and Power
- Measurement range: Limit 0 ~ 10 ppm

Nitratax sc



- UV absorption method – proven, continuous, and precise
- Eliminates reagents, sampling, and sample conditioning
- Self-cleaning sensor using built-in wiper
- Recommended Applications: Drinking Water, Wastewater, Industrial Water, Environmental
- Measurement range: 0.1 to 100mg/L (depending on the selection)

astroTOC Analzyer



- Industrial design withstands severe conditions
- Flexible analysis system allows analysis of high salt and hard-to-oxidize samples
- Automatic calibration, validation and cleaning
- Recommended Applications: Wastewater, Industrial Water
- Measurement range: 0-5 up to 20,000 mg/L TOC

Phosphax sc



- Plug and play method with the controller
- Fast response time of 5 minutes m including sample preparation
- East installation with low cost of operation with proven analysis method
- Recommended Applications: Wastewater, Industrial Water
- Measurement range: 0.05mg/L to 50mg/L

ASIS SCIENTIFIC

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