



Nitrogen

Nitrogen Measurements: Ammonium · Nitrate · Nitrite

Wastewater treatment processes are concerned with controlling the energy efficient removal of pollutants in the smallest possible space in the shortest possible time.

Required are:

- detailed knowledge of the underlying process
- highest possible transparency of the process steps through corresponding measuring methods

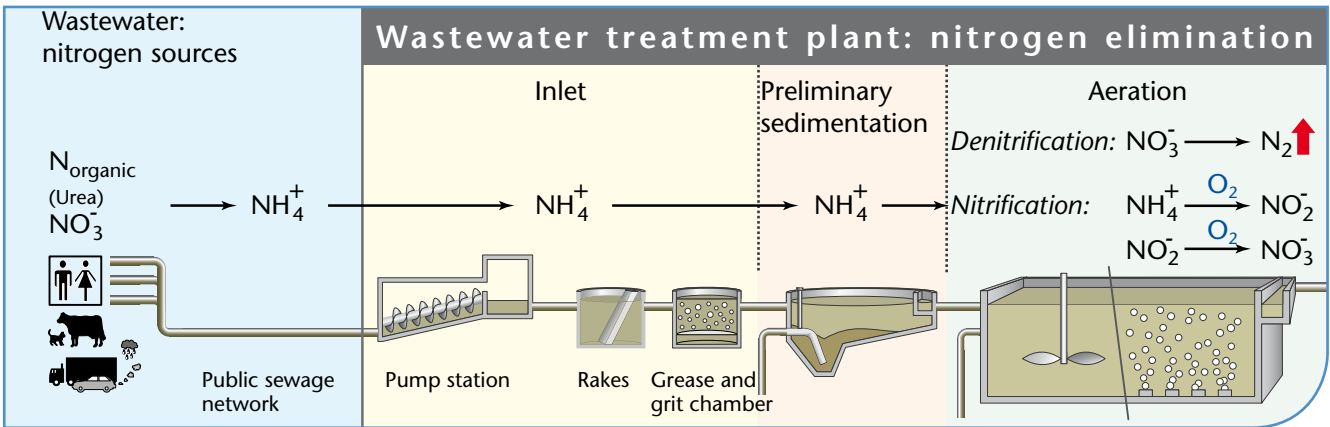
The efficient control of Nitrogen in wastewater systems is possible by making those measurements directly in the wastewater process. This not only ensures purification but above all guarantees economic operation of the entire plant.

Purification processes for the removal of nitrogen from wastewater

Nitrogen is found in a large variety of compounds and forms and is considered to be the ultimate “quick-change artist”. In municipal wastewater it is mainly encountered as a waste product in the form of urea, which is already converted in part to ammonium nitrogen by ammonification.

In the aeration basin, the initial step of nitrification consists in oxidizing the nitrogen present in wastewater via nitrite to nitrate, for which oxygen is required. During subsequent denitrification the nitrate (NO_3^-) is further converted to elemental nitrogen N_2 under the absence of oxygen. This nitrogen in gas form is harmlessly released into the environment.

Due to the various framework conditions and different biologically active groups of microorganisms, both methods are conducted in two fundamentally separate processes. The temporal and spatial sequence can be adapted to local conditions.



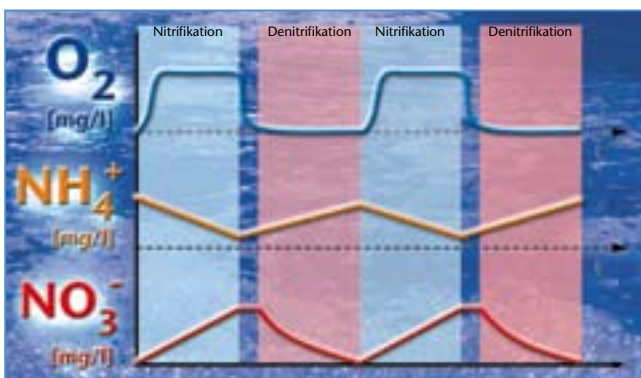
Measuring method for tracing nitrogen elimination

Up to date a common measuring method is targeted at oxygen availability. As oxygen is required for nitrification sub-processes, but prevents denitrification, this process parameter is determined online and traced. It is often used for controlling the oxygen input or aerator aggregates.

Redox inflexion point determination has become less significant as an indirect controlled and actuation variable due to the generally known difficulty (i.e. unclear curve progression). Direct measuring procedures for the process measuring ammonium and nitrate are far more interesting. The immediately available parameters allow the control to be directly optimized. This guarantees efficient wastewater purifications. This results in reduced energy costs.

The following example of intermittent procedure illustrates the advantage of direct measurement of selected parameters.

Nitrification and denitrification are conducted in succession in the same basin. In the nitrification phase ammonium is oxidized using oxygen to form nitrate. The nitrate content increases accordingly. In the denitrification phase nitrate is reduced to form gaseous nitrogen; ammonium is formed from residual organic nitrogen. Ammonium and nitrate curves display opposite behavior.



Example: intermittent nitrification/denitrification

Correlation between the individual procedure measurements of dissolved oxygen, ammonium and nitrate

In order to minimize energy consumption in the aeration basin, a preferably efficient and low O₂ input should be targeted for complete nitrogen oxidation. Furthermore, the optimum efficiency of denitrification stages with anaerobic or anoxic conditions must be ensured. For optimum growth of nitric bacteria, higher concentrations of dissolved oxygen are generally required than for the pure decomposition of organic carbon compounds. The online measurement of the selected parameter of ammonium, which provides the possibility of NH₄-N controlled operation, makes the nitrification process transparent and offers significantly higher potential for energy saving of certainty than in pure O₂ controlled operation. A combined measurement of NH₄-N and O₂ is suitable for plant operation, as this prevents the formation of bulking sludge in the lower range and limits the oxygen input should interferences occur in NH₄-N decomposition (e.g. caused by a disturbed nutrient ratio of carbon : nitrogen : phosphate). This can create significant savings potentials.

Improve your plant process values – invest and save

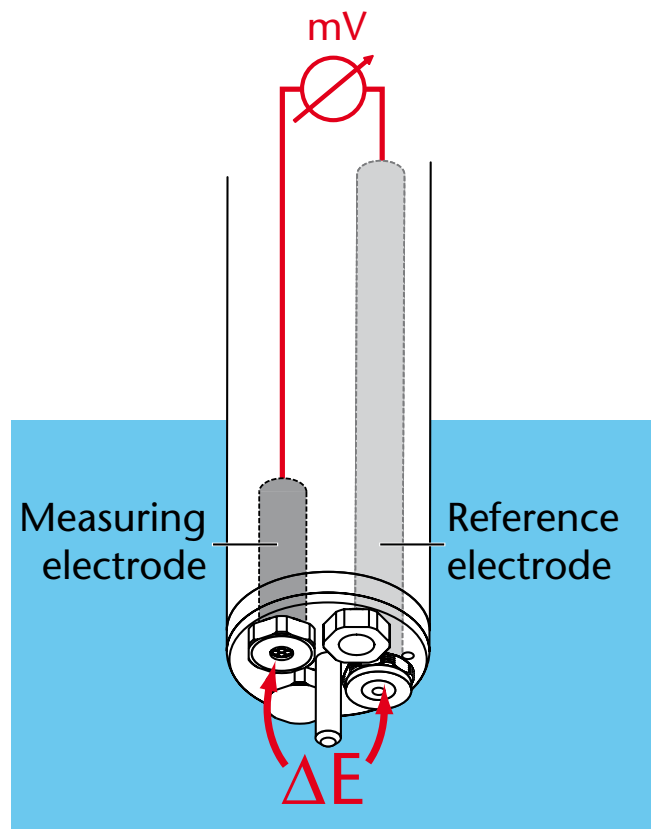
The VARiON® technology makes it possible!

Besides the common measuring of ammonium and nitrate using an analyzer, WTW has now since several years offered the measuring of ammonium and nitrate based on ionselective measuring (ISE).

Same as the pH measuring, the ISE measuring is based on the selectivity of membranes towards special material and is accordingly easy with the handling.

A tension ΔE is caused due to the selectivity between the work and reference electrode. This tension can be read as measuring value by using a transformer.

The direct measuring VARiON® technology enables an optimization of the plant in respect to cleaning performance and energy consumption. This investment can be amortized in a comparably short period (please see info box) through a decrease of discharge values.



$$\Delta E = E_{(ISE)} - E_{(Ref)}$$

WTW ISE sensors

- As easy as measuring pH
- The original – reliable results through established technology
- No chemicals used

Additional information:

When a local sewage treatment plant in Germany for example achieves a reduced discharge value of at least 20% by using a VARiON®, the owner of the plant is entitled to make a declaration regarding the compliance of low monitoring values acc. to § 4 Abs. 5 AbwAG.

The amount of investment can be considered with the calculation for wastewater charges for the past 3 years if applicable.

NEW

Compensation-free nitrate electrode

- Measuring nitrate made even easier
- Cost-effective fully compensated nitrate measuring with NitraLyt^{®Plus} 700 IQ/VARiON^{®Plus}
- Extremely robust

VARiON^{®Plus} NO₃-HS

With its special membrane, this electrode enables the measuring of nitrate without the compensation electrode for chloride.

A system that is perfectly tailored for the dedicated usage.

The online measuring technology with ISE electrodes convinces with further valuable characteristics, enhancing the overall handling of the measuring technology. The VARiON[®] for example offers two compensated parameters in one armature. This again enables the ideal process control for being fast and cost-effective at the same time. Same as all IQ SENSOR NET armatures, the ISE armatures are of course robust and long-lasting.

Demanding operation requires strong quality material

For ensuring the usage of ISE technology to run also under demanding conditions of wastewater technology economically, the WTW electrodes convince through the following characteristics:

- Exchange of single electrodes. The automatic recognition of electrodes further enhances the handling with the system.
- Compared to common electrodes, the WTW ISE online electrode being protected by a stainless steel grid, can be cleaned with a normal brush.
- The special construction of the membranes i.e. with high electrolyte storage reservoir enables a runtime of up to two years, depending on the application.

As the ISE technology manages without using chemicals, it also contributes towards health and environmental protection by avoiding the usage of partially toxic chemicals.



Parameter section

Dissolved Oxygen

pH/ORP

Conductivity

 Turbidity/
Suspended Solids

Nitrogen

Phosphate

 Carbon: COD/TOC/
DOC/BOD/SAC

Also refer to page 49.

Direct measuring procedures for determining ammonium and nitrate

The dynamics of the controllable process and the used measuring system are of great importance for the measuring and control technology. Here applies: the faster the control process and disturbance variables, the shorter recognition times are expected from the measuring system.



See page 43 for various measuring systems and applications.

in-situ ISE sensors

These control engineering demands led to the development of in-situ ISE (ion-selective) measuring techniques, which are capable of directly recording the respective selected parameter ammonium and nitrate during the process both quickly and without sample preparation.

in-situ UV/VIS probes

in-situ UV/VIS spectrometric probes represent a precise measuring technique with long-term stability, which permit quasi-continuous recording of the selected parameter in the smallest measuring cycles of minutes. The disturbance variables for optical measuring, such as turbidity/suspended solids, are eliminated by spectral recording.

Analyzers

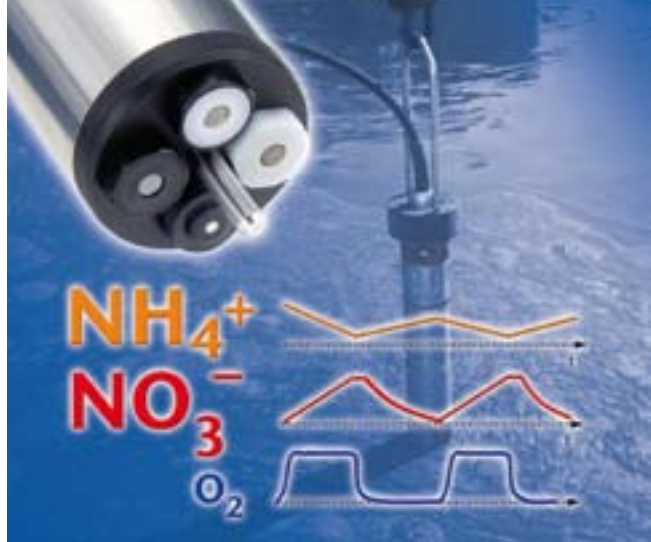
Depending on measurements and applications, analyzer systems require standard and reagent solutions as well as sample preparation. Measuring intervals and automatic cleaning cycles are adjustable. These instruments automatically and recurrently compare measurements against reference standards and deliver high precision measurement values.

NEW

VARiON®Plus 700 IQ



- In-situ combination sensor for ammonium and nitrate
- 2 compensated parameters simultaneous
- Economic, cost-effective
- Calibration-free, long time stable



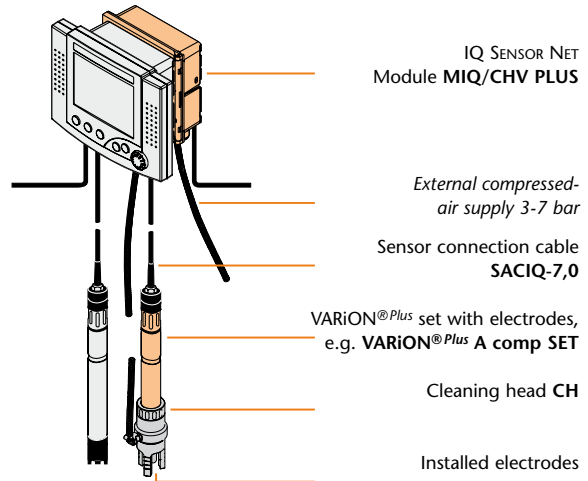
Ammonium and Nitrate ion-selective with automatic compensation of interferences

Ion-selective measurements directly in process – reliable 24 hours a day

The new highly variable ionic sensor VARiON®Plus allows:

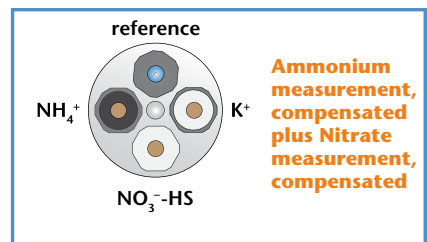
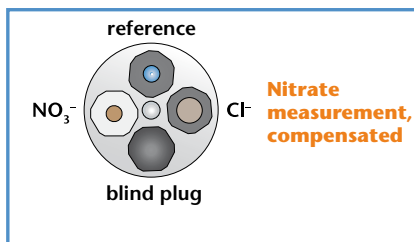
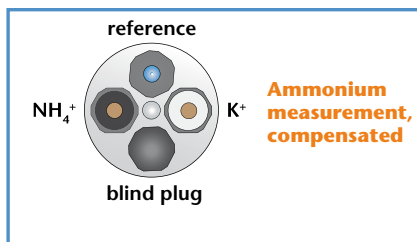
- The continuous measurement of ammonium – with online compensation of potassium ion interference by using potassium ISE.
- The new electrode VARiON®Plus NO₃-HS enables the measuring of nitrate without chloride compensation electrode.
- You can measure ammonium and nitrate using one sensor with perfect gradient display.

For measurement, simply insert the suitable electrode into the sensor, everything else is working automatically. The display shows the already compensated values. The potassium measuring value can be displayed optionally. These values are available via the 0/4–20 mA analog outputs or via the digital output PROFIBUS or Modbus.



recommended components per VARiON®Plus measuring place: orange

Possible configurations



IQ-LabLink

With the initial installation of VARiON®Plus the dependency of the used electrode reference values for ammonium, nitrate, chloride and potassium is determined by a photometric system and can be adapted with VARiON®Plus.

The measuring data is required for guaranteeing a precise matrix adaption.

For enhancing the data transfer between the laboratory spectrophotometers photoLab® 6100/6600 and



VARiON®Plus, a USB memory stick in combination with the IQ-LabLink function can be used for the MIQ/TC 2020 XT to automatically read the data and store it on the VARiON®Plus.

- Safe, comfortable and fast data transfer
- Automatic plausibility check of data

Technical Data VARiON®Plus							
Maximum Configuration	Common reference electrode, two measuring electrodes, one compensation electrode						
	<table border="1"> <thead> <tr> <th>Ammonium Measurement</th> <th>Nitrate Measurement</th> </tr> </thead> <tbody> <tr> <td> Integrable Electrodes: Reference Electrode: VARiON®Plus Ref Measuring Electrode: VARiON®Plus NH₄ Compensation Electrode: VARiON®Plus K </td> <td> VARiON®Plus NO₃ or VARiON®Plus NO₃-HS VARiON®Plus Cl </td> </tr> <tr> <td> Measuring Ranges / Resolution NH₄-N: 1 ... 1,000 mg/l / 1 mg/l; 0.1 ... 100 mg/l / 0.1 mg/l NH₄⁺: 1 ... 1,290 mg/l / 1 mg/l; 0.1 ... 129.0 mg/l / 0.1 mg/l Compensation Ranges K⁺: 1 ... 1,000 mg/l / 1 mg/l </td> <td> NO₃-N: 1 ... 1,000 mg/l / 1 mg/l; 0.1 ... 100 mg/l / 0.1 mg/l NO₃⁻: 5 ... 4,500 mg/l / 1 mg/l; 0.5 ... 450.0 mg/l / 0.1 mg/l Cl⁻: 1 ... 1,000 mg/l / 1 mg/l </td> </tr> </tbody> </table>	Ammonium Measurement	Nitrate Measurement	Integrable Electrodes: Reference Electrode: VARiON®Plus Ref Measuring Electrode: VARiON®Plus NH ₄ Compensation Electrode: VARiON®Plus K	VARiON®Plus NO ₃ or VARiON®Plus NO ₃ -HS VARiON®Plus Cl	Measuring Ranges / Resolution NH ₄ -N: 1 ... 1,000 mg/l / 1 mg/l; 0.1 ... 100 mg/l / 0.1 mg/l NH ₄ ⁺ : 1 ... 1,290 mg/l / 1 mg/l; 0.1 ... 129.0 mg/l / 0.1 mg/l Compensation Ranges K ⁺ : 1 ... 1,000 mg/l / 1 mg/l	NO ₃ -N: 1 ... 1,000 mg/l / 1 mg/l; 0.1 ... 100 mg/l / 0.1 mg/l NO ₃ ⁻ : 5 ... 4,500 mg/l / 1 mg/l; 0.5 ... 450.0 mg/l / 0.1 mg/l Cl ⁻ : 1 ... 1,000 mg/l / 1 mg/l
Ammonium Measurement	Nitrate Measurement						
Integrable Electrodes: Reference Electrode: VARiON®Plus Ref Measuring Electrode: VARiON®Plus NH ₄ Compensation Electrode: VARiON®Plus K	VARiON®Plus NO ₃ or VARiON®Plus NO ₃ -HS VARiON®Plus Cl						
Measuring Ranges / Resolution NH ₄ -N: 1 ... 1,000 mg/l / 1 mg/l; 0.1 ... 100 mg/l / 0.1 mg/l NH ₄ ⁺ : 1 ... 1,290 mg/l / 1 mg/l; 0.1 ... 129.0 mg/l / 0.1 mg/l Compensation Ranges K ⁺ : 1 ... 1,000 mg/l / 1 mg/l	NO ₃ -N: 1 ... 1,000 mg/l / 1 mg/l; 0.1 ... 100 mg/l / 0.1 mg/l NO ₃ ⁻ : 5 ... 4,500 mg/l / 1 mg/l; 0.5 ... 450.0 mg/l / 0.1 mg/l Cl ⁻ : 1 ... 1,000 mg/l / 1 mg/l						
Temperature Measurement and Compensation	Integrated NTC thermistor, Range 32 °F ... 104 °F (0 °C ... +40 °C), Accuracy ±0.5 K, Resolution 0.1 K, t ₉₅ < 20 s						
Calibration Procedures	2-point-calibration with multiple standard solutions, calibration against any reference value						
Ambient Conditions	Operating temperature: 32 °F ... 104 °F (0 °C ... +40 °C), storing temperature: 32 °F ... 104 °F (0 °C ... +40 °C)						
pH Range	pH 4 ... pH 8.5 pH 4 ... pH 11						
Measuring Accuracy in laboratory standard solutions	± 5 % of measured value ± 0.2 mg/l in standard solutions						
Working Life (typically)	All electrodes: 18 months (in typical application - sewage plants)						
Mechanical	Sensor body: V4A stainless steel 1.4571 Protective cup: POM Temperature sensor: V4A stainless steel 1.4571 Protection rating: IP 68 (0.2 bar, with installed electrodes) Electrode connector: POM						
Max. Pressure	Maximum 0.2 bar (incl. SACIQ sensor connection cable, with installed electrodes)						
Power Consumption	0.2 Watt						
Dimensions	14.45 x 1.57 in. (367 x 40 mm, length x diameter), incl. SACIQ sensor connection cable						
Weight	Approx. 1.76 lb (800 g, without electrodes, without SACIQ sensor connection cable)						
Guaranty	VARiON®Plus 700 IQ: 2 years for defects of quality						

Ordering Information		
VARiON®Plus SETs	Consisting of probe, reference electrode, measuring and compensation electrodes	Order No.
VARiON®Plus A comp SET	Ammonium measurement, compensated	107 060
VARiON®Plus N comp SET	Nitrate measurement, compensated	107 062
VARiON®Plus AN/A comp SET	Ammonium measurement, compensated, plus nitrate measurement	107 066
VARiON®Plus AN/N comp SET	Nitrate measurement, compensated, plus ammonium measurement	107 068
Standard Solutions	for VARiON®Plus, AmmoLyt®Plus, NitaLyt®Plus	Order No.
VARiON®Plus/ES-1	Combined standard 1 (low concentration), 1000 ml	107 050
VARiON®Plus/ES-2	Combined standard 2 (high concentration), 1000 ml	107 052
Accessories	For automatic cleaning. Recommended for permanent operation.	Order No.
MIQ/CHV PLUS	Valve module for automatic cleaning by compressed air controlled directly via the IQ SENSOR NET bus	480 018
DIQ/CHV	Valve module for automatic compressed air cleaning for System 182; accessible by means of an DIQ/S 182 relay	472 007
CH	Cleaning head	900 107



* on armature

AmmoLyt®Plus



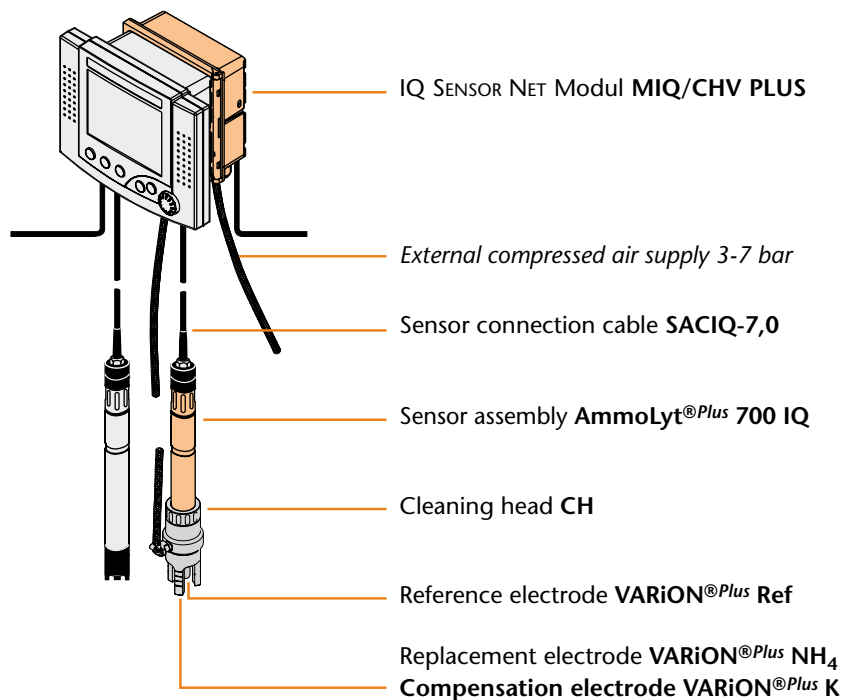
- In-situ-Ammoniumsensor with potassium compensation
- Economic, cost-effective
- Calibration-free, long term stable
- Short response time

Ammonium Measurement directly in the Medium – without Sample Preparation

The continuous measuring of O₂ and NH₄ can result in significant savings through:

- energy-optimized operation due to demand-oriented regulation of aerator aggregates,
- adherence to critical values or reduction of wastewater charges.
- The potassium measuring value can be displayed optionally.

The low investment costs for the system can thus be amortized after a short period.



recommended components per AmmoLyt®Plus measuring place: orange

IQ-LabLink

With the initial installation of AmmoLyt®Plus the dependency of the used electrode reference values for ammonium or potassium is determined by a photometric system and can be adapted with AmmoLyt®Plus.

The measuring data is required for guaranteeing a precise matrix adaption.

For enhancing the data transfer between the laboratory spectrophotometers photoLab® 6100/6600 and AmmoLyt®Plus, a USB memory stick in combination with the IQ-LabLink function can be used for the MIQ/TC 2020 XT to automatically read the data and store it on AmmoLyt®Plus.

- Safe, comfortable and fast data transfer
- Automatic plausibility check of data

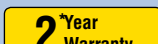


Technical Data AmmoLyt®Plus

Appropriate Electrode	Reference electrode VARiON®Plus Ref, Measuring electrode VARiON®Plus NO ₃ , Compensation electrode VARiON®Plus Cl
Measuring Ranges/Resolution	NH ₄ -N: 1 ... 1000 mg/l / 1 mg/l; 0.1 ... 100 mg/l / 0.1 mg/l NH ₄ ⁺ : 1 ... 1290 mg/l / 1 mg/l; 0.1 ... 129.0 mg/l / 0.1 mg/l
Compensation Range:	K ⁺ : 1 ...1000 mg/l / 1 mg/l
Temp. Measurement and Compensation	Integrated NTC thermistor Range: 32 ... 104 °F (0 ... +40 °C), Accuracy ±0.5 K, resolution 0.1 K, t ₉₅ < 20 s
Calibration Procedures	Matrix adjustment against any reference value, 2-point-calibration possible with multiple standard solution
Ambient Conditions	Integrated NTC thermistor Range: 32 ... 104 °F (0 ... +40 °C), Accuracy ±0.5 K, resolution 0.1 K
pH Range	pH 4 ... pH 8.5
Measuring Accuracy in laboratory standard solutions	± 5% of measured value ± 0.2 mg/l in standard solutions
Working Life (typically)	All electrodes: 18 months (in typical application - sewage plants)
Mechanical	Sensor body: V4A Stainless Steel 1.4571 Protective cap: POM, Temp. sensor: V4A Stainless Steel 1.4571 Protection rating: IP 68 (0.2 bar, with installed electrodes) Electrode connector: POM
Max. Pressure	Maximum 0.2 bar (incl. SACIQ sensor connection cable; with installed electrodes)
Power Consumption	0.2 Watt
Dimensions	15.43 x 1.57 in. (392 x 40 mm, length x diameter), incl. sensor connection cable SACIQ
Weight	Approx. 1.48 lb (670 g, without electrode, without sensor connection cable)
Guaranty	AmmoLyt®Plus 700 IQ: 2 years for defects of quality

Ordering Information

AmmoLyt®Plus-System		Order No.
AmmoLyt®Plus 700 IQ	Robust digital armature for ion-selective electrodes (VARiON®Plus Ref/VARiON®Plus NH ₄ /VARiON®Plus K; not included in the delivery scope)	107 080
VARiON®Plus Ref	Reference electrode for VARiON®Plus 700 IQ/AmmoLyt®Plus 700 IQ/NitraLyt®Plus 700 IQ	107 042
VARiON®Plus NH₄	Ammonium electrode	107 044
VARiON®Plus K	Electrode for dynamic potassium compensation with ammonium measuring	107 046
CH	Cleaning head	900 107
MIQ/CHV PLUS	Valve module for automatic cleaning by compressed air controlled directly via the IQ SENSOR Net bus	480 018
DIQ/CHV	Valve module for automatic compressed air cleaning for System 182; accessible by means of an DIQ/S 182 relay	472 007



* on armature

Standard Solutions see brochure "Product Details"



TresCon® OA 110

- Continuous measurements
- Automatic calibration
- Short response time

On-line ammonium measurement

- Continuous ammonium value monitoring in sewage plant effluent
- Analysis of the ammonium-nitrogen pollution in surface waters
- Monitoring water treatment plants



Measuring Principle

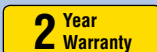
The continuous determination of ammonium in the OA 110 module is carried out according to the potentiometric measuring principle with a gas-sensitive NH_3 electrode. Sodium hydroxide is added to the thermostatted sample to convert the ammonium dissolved in the medium into undissociated ammonia gas. The gaseous ammonia alters the pH registered by the measuring electrode; the alteration is a direct measure of the ammonium concentration in the sample.

Technical Data OA 110

	Standard 1	Standard 2*
Measuring Ranges	$\text{NH}_4\text{-N}$: 0.1 ... 1000 mg/l; $\text{NH}_4\text{+}$: 0.1 ... 1280 mg/l;	$\text{NH}_4\text{-N}$: 0.05 ... 10 mg/l; 0.005 ... 0.71 mmol/l* $\text{NH}_4\text{+}$: 0.05 ... 12.8 mg/l; 0.005 ... 0.71 mmol/l*
Resolution (Display)	Range: 0.10 ... 10 mg/l: 10.0 ... 100 mg/l: 100 ... 1000/1280 mg/l:	Range: 0.05 ... 10 mg/l: 0.01 mg/l
Accuracy	$\pm 5\%$ of the measured value ± 0.2 mg/l at < 1 mg/l $\text{NH}_4\text{-N}$ $\pm 5\%$ of the measured value ± 0.1 mg/l at 1.0 ... 100 mg/l $\text{NH}_4\text{-N}$	$\pm 5\%$ of the measured value ± 0.05 mg/l at < 1 mg/l $\text{NH}_4\text{-N}$ * $\pm 5\%$ of the measured value ± 0.1 mg/l at 1.0 ... 10 mg/l $\text{NH}_4\text{-N}$ *
Coefficient of Variation of Method	Range: 0.10 ... 10 mg/l: 3% 10.0 ... 100 mg/l: 4% 100 ... 1000/1280 mg/l: 5% (values for calibration with suitable standard solutions)	
Response time	< 3 min (after alternation in concentration at module input)	
Measuring Interval	Continuous Mode and 10, 15, 20, 25, 30 min interval selectable, AutoAdapt, Interval-Program	
Calibration	Automatic 2-point calibration (AutoCal) with two standard solutions	
Sample input	Approx. 0.3 l/h, solids content < 50 mg/l	
Consumption	Reagent, 10 l: 14/30/50 days at measuring intervals cont./20/30 min Standard solutions A/B, 1.5 l: 60 days with 24 Std. calibration interval Cleaning solution 1.5 l: 60 days with 24 Std. cleaning interval	
Maintenance Interval	Every 6 months	
Guaranty	2 years for defects of quality	

Ordering Information

		Order No.
OA 110	Separate TresCon® analyzer module for ammonium-nitrogen for extension of an existing TresCon® system (requires 1 measuring place)	820 008
TresCon® A 111	TresCon®-basic instrument with analysis module OA 110 for ammonium-nitrogen (wall mounting, space for 2 further modules)	8A-10030
TCU/A111	TresCon® Uno ammonium: single parameter system ammonium with analysis module OA 110 for ammonium-nitrogen	820 101



Accessories and consumables see brochure "Product Details"

* around calibration standard

NitraLyt® Plus

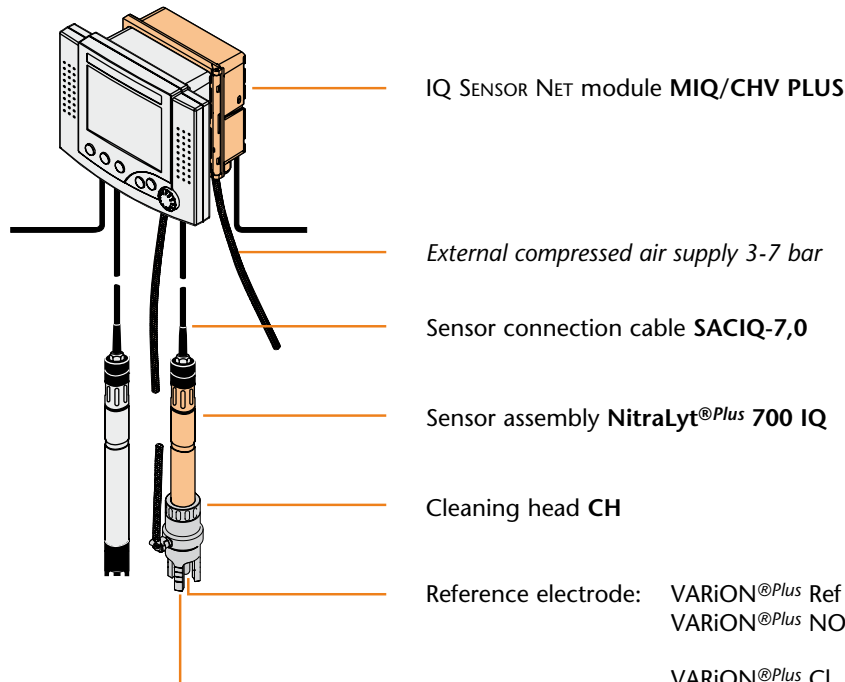


- In-situ nitrate sensor with optional chloride compensation
- Economic, cost-effective
- Calibration-free, long term stable
- Short response time

Nitrogen Elimination Process – monitored, optimized, cost effective

The optimization of nitrification/denitrification during wastewater treatment is simplified even further by the new NitraLyt® Plus system:

- Nitrate is also directly measurable during the process in addition to oxygen and ammonium.
- Measured values are promptly available and can be used directly to control the process.
- Low investment and maintenance costs (automatic compressed air cleaning system).



NEW

VARION® Plus NO₃-HS

recommended components per NitraLyt® Plus measuring place: orange

IQ-LabLink

With the initial installation of NitraLyt®Plus the dependency of the used electrode reference values for nitrate and chloride is determined by a photometric system and can be adapted with NitraLyt®Plus.

The measuring data is required for guaranteeing a precise matrix adaption.

For enhancing the data transfer between the laboratory spectrophotometers photoLab® 6100/6600 and NitraLyt®Plus, a USB memory stick in combination with the IQ-LabLink function can be used for the MIQ/TC 2020 XT to automatically read the data and store it on NitraLyt®Plus.

- Safe, comfortable and fast data transfer
- Automatic plausibility check of data



Technical Data NitraLyt®Plus	
Appropriate Electrodes	Reference electrode VARION®Plus Ref, Measuring electrode VARION®Plus NO ₃ , Compensation electrode VARION®Plus Cl, VARION®Plus NO ₃ -HS
Measuring Ranges/ Resolution	NO ₃ -N: 1 ... 1000 mg/l / 1 mg/l; 0.1 ... 100.0 mg/l / 0.1 mg/l NO ₃ -: 5 ... 4500 mg/l / 5 mg/l; 0.5 ... 450.0 mg/l / 0.5 mg/l Cl-: 1 ... 1000 mg/l / 1 mg/l
Temp. Measurement and Compensation	Integrated NTC thermistor Range: 32 ... 104 °F (0 °C ... +40 °C), Accuracy ±0.5 K, resolution 0.1 K, t ₉₅ < 20 s
Calibration Procedures	Matrix adjustment against any reference value, 2-point-calibration possible with multiple standard solution
Ambient Conditions	Operating temperature: 32 °F ... 104 °F (0 °C ... + 40 °C), storing temperature: 32 °F ... 104 °F (0 °C ... + 40 °C)
pH Range	pH 4 ... pH 11
Measuring Accuracy in laboratory standard solutions	±5% of measured value ± 0.2 mg/l in standard solutions
Working Life (typically)	All electrodes: 18 months (in typical application - sewage plants)
Mechanical	Sensor body: V4A Stainless Steel 1.4571 Protective cap: POM, Temp. sensor: V4A Stainless Steel 1.4571 Protection rating: IP 68 (0.2 bar, with installed electrodes) Electrode connector: POM
Max. Pressure	Maximum 0.2 bar (incl. SACIQ sensor connection cable; with installed electrodes)
Power Consumption	0.2 Watt
Dimensions	15.43 x 1.57 in. (392 x 40 mm, length x diameter), incl. sensor connection cable SACIQ
Weight	Approx. 1.48 lb (670 g, without electrode, without sensor connection cable)
Guaranty	NitraLyt®Plus 700 IQ: 2 years for defects of quality
Ordering Information	
NitraLyt®Plus_System	Order No.
NitraLyt®Plus 700 IQ	Robust digital armature for ionselective electrodes (VARION®Plus Ref/VARION®Plus NO ₃ /VARION®Plus Cl/ VARION®Plus NO ₃ -HS; not included in the delivery scope) 107 080
VARION®Plus Ref	Reference electrode for VARION®Plus 700 IQ/AmmoLyt®Plus 700 IQ/NitraLyt®Plus 700 IQ 107 042
VARION®Plus NO ₃	Nitrate electrode for measuring nitrate with dynamic Cl compensation 107 045
VARION®Plus NO ₃ -HS	Nitrate electrode for measuring nitrate with automatic Cl compensation 107 049
VARION®Plus Cl	107 047
CH	Cleaning head 900 107
MIQ/CHV PLUS	Valve module for automatic cleaning by compressed air controlled directly via the IQ SENSOR NET bus 480 018
DIQ/CHV	Valve module for automatic compressed air cleaning for System 182; accessible by means of an DIQ/S 182 relay 472 007
<i>Standard solutions see brochure "Product Details"</i>	
* on armatures	

NitraVis® - System

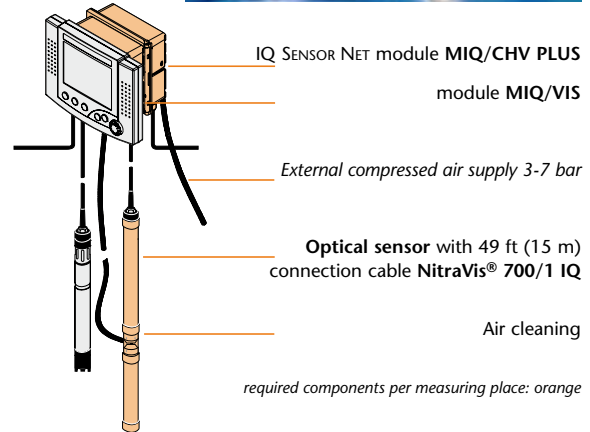


- In-situ nitrate sensor
- Precise optical measurement
- No chemicals or consumables

in-situ Measurement of Nitrate and Suspended Solids (optional)

High-precision spectral measurement allows determination of the real nitrate value. Interfering influences caused for example by nitrite or suspended solids are easily detected due to the available spectral information and automatically taken into account or used for compensation.

The investment costs, which are slightly higher than those for the ion-selective measuring method, do not entail operation costs, amortizing the investment after a very short period.



Technical Data NitraVis® System

Measuring Principle	Spectral Measurement in the UV/VIS Range (200 - 750 nm)		
Applications	Municipal wastewater: inlet, aeration, outlet		
Measuring Range Nitrate Standard	NO ₃ -N:	NitraVis® 700/1 0.1 ... 100,0 mg/l inlet, aeration	NitraVis® 700/5 0.01 ... 25,00 mg/l outlet
Accuracy	±3% of measured value ±0.5 mg/l (with Check algorithm, in standard solution)		
Measuring Range Suspended Solids (Option)	TSS: municipal wastewater:	0 ... 10.00 g/l inlet, aeration	0 ... 900.0 mg/l outlet
Materials	Housing: Al Mg Si 1, anodized Window: Sapphire glass		
Pressure Resistance	≤1 bar		
Ambient Conditions	Housing: Al Mg Si 1, anodized Window: Sapphire glass		
Flow velocity	≤3 m/s		
pH range	pH 4 ... pH 9		
Salt content of medium	< 5000 mg/l (Chloride)		
Dimensions	25.59 x 1.73 in. (650 x 44 mm; length x max. diameter)		
Weight	Approx. 2.43 lb (1.1 kg)		
Guaranty	2 years for defects of quality		

Ordering Information

NitraVis® System	Every Sensor with 49 ft. (15 m) cable and compressed air tubing	Order No.
NitraVis® 700/1 IQ	Optical Nitrate probe; path length 1 mm	481 021
NitraVis® 700/1 IQ TS	as NitraVis® 700/1 IQ; with integrated TSS measurement	481 022
NitraVis® 700/5 IQ	Optical Nitrate probe; path length 5 mm	481 023
NitraVis® 700/5 IQ TS	as NitraVis® 700/5 IQ; with integrated TSS measurement	481 024
MIQ/VIS	Connection module for UV/VIS sensor; directly controls the valve module for compressed air cleaning	481 029
MIQ/CHV PLUS	Valve module for automatic cleaning by compressed air controlled directly via the IQ SENSOR NET bus	480 018
DIQ/CHV	Valve module for automatic compressed air cleaning for System 182; accessible by means of an DIQ/S 182 relay	472 007





TresCon® ON 210/OS 210

- Reagent-free measuring method
- 4-beam measuring method for optimal background compensation
- Simultaneous nitrate and SAC determination (OS 210)

Nitrate/SAC measurement

- Regulating nitrate degradation in denitrification
- Continuous monitoring of nitrate effluent values
- Organic pollution SAC (OS 210)



Measuring Principle Nitrate

The ability of nitrate ions to absorb UV light of certain wavelengths is used for measuring the nitrate. The ultraviolet light from a pulsed photoflash lamp passes through a flow-thru measuring cuvette where it is partially absorbed by the nitrate ions present in the sample flow. The intensity of the attenuated light is measured at a measuring wavelength and at a reference wavelength and evaluated electronically. The 4-beam measuring method used ensures a high degree of long-term stability and absolute accuracy; interfering background influences are efficiently compensated.

SAC measuring principle

Absorption measurement of aqueous sample in UV range. The SAC (spectral absorption coefficient), measured with a wavelength of 254 nm, represents the organic water pollution.

Technical Data ON 210/OS 210

Measuring Range	NO ₃ -N: 0.1 - 60 mg/l	0 - 4000 mmol/l
	NO ₃ : 0.1 - 250 mg/l	0 - 4000 mmol/l
	SAC: 0.1 - 200m ⁻¹	
Resolution (Display)	Nitrate: Range: 0.1 ... 100 mg/l : 0.1 mg/l 100 ... 250 mg/l : 1 mg/l SAC: 0.1 m ⁻¹ (only OS 210)	
Accuracy	±2% of the measured value ± 0.4 mg/l	
Coefficient of variation for method	2%	
Response Time	30 s (after alteration in concentration at module input)	
Measuring interval	Continuous mode and 5, 10, 15, 20, 25, 30 min intervals selectable, AutoAdapt, Interval-Program	
Calibration	Automatic zero balance, works calibration	
Sample Flow Rate	0.5 l/hr approx., suspended solids content <50 mg/L	
Consumption	Distilled water, 10 l: 130 days with 24 h interval for zero balance Cleaning solution, 1.5 l: 120 days with 24 h cleaning interval	
Maintenance Interval	Every 6 months	
Guaranty	2 years for defects of quality	

Ordering Information

Separate TresCon® analyzer module for nitrate (+ SAC) for extension of an existing TresCon® system (requires 1 measuring place)	Order No.
ON 210 Nitrate	820 007
OS 210 Nitrate + SAC	820 010
TresCon® basic instrument with analysis module ON 210 (nitrate) or OS 210 (nitrate + SAC) (wall mounting, space for 2 further modules)	Order No.
TresCon® N 211 Nitrate	8A-20030
TresCon® S 211 Nitrate + SAC	8A-70030
TresCon® Uno single parameter system nitrate or nitrate + SAC with analysis module ON 210 or OS 210	Order No.
TCU/N211 TresCon® Uno nitrate	820 102
TCU/S211 TresCon® Uno nitrate + SAC	820 107



Accessories and consumables see brochure "Product Details"


TresCon® ON 510

- Continuous background compensation
- Reliable and Accurate – 2-beam reference photometer
- Can be used in weakly polluted water without sample preparation

On-line nitrite measurement

- Observation of the nitrification process
- Monitoring nitrite effluent values
- Measurement checks in drinking water treatment
- Monitoring nitrite pollution in natural waters
- Monitoring of critical values in fish farming



Parameter section

Dissolved Oxygen

pH/ORP

Conductivity

 Turbidity/
Suspended Solids

Nitrogen

Phosphate

 Carbon: COD/TOC/
DOC/BOD/SAC

Measuring Principle

The measuring principle of the NO₂ analyzer module is based on the azo dye method. A reagent reacts with nitrite to color the sample solution pink. The intensity of the pink color is proportional to the nitrite concentration in the sample and is measured by a double-beam reference photometer. An additional manual correction facility allows the system to be adapted to plant-specific characteristics so that a high degree of measuring accuracy can be achieved even with strongly colored samples.

Technical Data ON 510

Measuring Range	NO ₂ -N: 0.005 - 1.200 mg/l 0.40 - 90 µmol/l NO ₂ -: 0.020 - 4.000 mg/l 0.40 - 90 µmol/l
Resolution (Display)	Range: 0.005 ... 1.200 mg/l : 0.001 mg/l 0.020 ... 4.000 mg/l : 0.001 mg/l 0.40 ... 90.00 µmol/l : 0.1 µmol/l
Accuracy	±2% of the measured value ±0.05 mg/l NO ₂ -N
Coefficient of variation for method	1%
Response Time	< 5 min to measured value (after alteration in concentration at module input)
Measuring interval	5, 10, 15, and 20 min intervals selectable, AutoAdapt, Interval-Program
Calibration	Automatic 2-point calibration, time and interval selectable
Background Correction	Continuous background compensation based on new WTW algorithm
Sample input	Approx. 0.06 l/h, solid content < 50 mg/l
Consumption	Reagent, 1 l: 20/40/80 days with 5/10/20 min measuring interval Standard B, 1 l: 80 days with 24 h calibration interval Cleaning solution, 1.5 l: 45 days with 24 h cleaning interval
Maintenance Interval	Every 6 months
Guaranty	2 years for defects of quality

Ordering Information

Model		Order No.
ON 510	Separate TresCon® analyzer module for nitrite for extension of an existing TresCon® system (requires 1 measuring place)	820 009
TresCon® N 511	TresCon® basic instrument with analysis module ON 510 for nitrite (wall mounting, space for 2 further modules)	8A-30030
TCU/N511	TresCon® Uno single parameter system nitrite with analysis module ON 510	820 103


Accessories and consumables see brochure "Product Details"