Nitrogen

Nutrient Parameter: Ammonium, Nitrate, Nitrite

Ammonium

Nitrogen is found in a large variety of compounds and forms, it 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 partly converted to ammonium nitrogen by ammonification.

Fields of application:

- Municipal wastewater (treatment plant)
  - Inlet
  - Biological Cleaning
  - Outlet
- Centrate water
- Deammonification (Anammox)
- Surface waters

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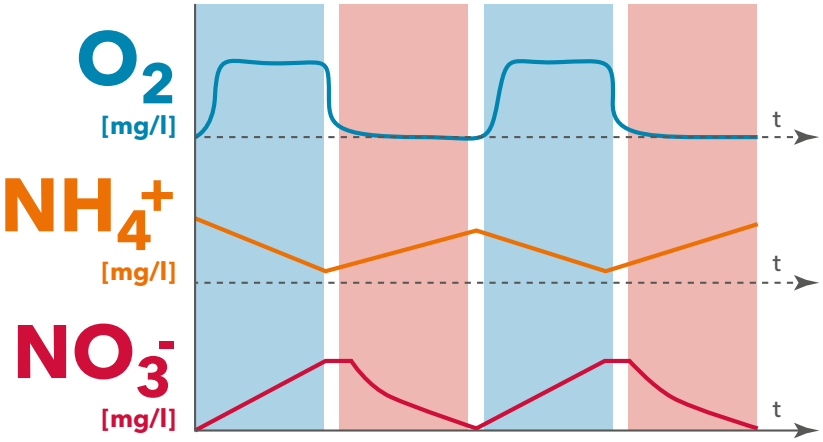
In the aeration basin, the initial step of nitrification consists of oxidizing the ammonium present in wastewater via nitrite to nitrate, for which oxygen is required. In the denitrification, nitrate is degraded to nitrogen gas under anaerobic conditions.

For fish, ammonium is already toxic in very small concentrations. Hence, water bodies with an ammonium concentration of 1 mg/l are not suitable for fish. Therefore, the discharge values, which have to be met by treatment plants, have to be very low.



Example: intermittent nitrification/denitrification

Nitrate

Nitrate is produced from ammonium in the nitrification process. To monitor and control this process and the subsequent denitrification (reduction of nitrate) in a wastewater treatment plant, nitrate is often measured among other parameters. As nitrification also takes place in soils and groundwater, whereby groundwater is the main source for drinking water in many countries, it often contains nitrate. The nitrate threshold value for drinking water in Europe is 50 mg/l.

As nitrate is used directly as a nutrient source for plant organisms, it is used as fertilizer in agriculture. High amounts of nitrates in fertilizers are often transfered into surface water and groundwater leading to eutrophication and therefore higher algae growth, as well as increasing nitrate content in drinking water.

In general, nitrate is harmless to people. In the human body nitrate may however be transformed into nitrite, which can be dangerous to health.

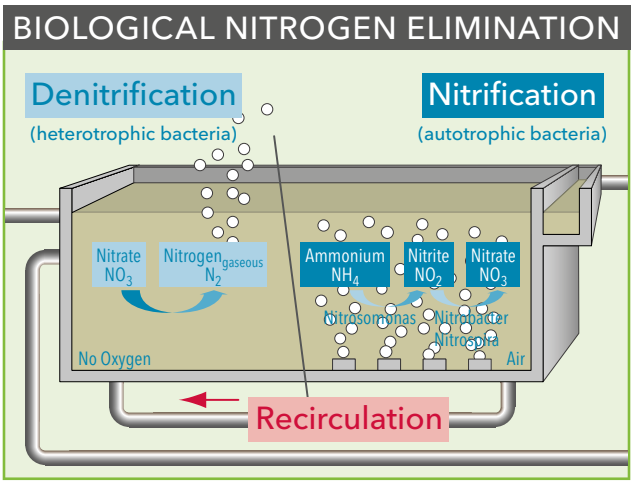
Nitrite

Nitrite occurs in considerably smaller amounts within wastewater treatment plants and soils. It is an intermediate product and oxidized very quickly into nitrate. Nevertheless, in newer cleaning processes of wastewater treatment plants (e.g. Anammox), nitrite is produced intentionally and therefore becomes measureable.

Nitrite is a fish poison and harmful to humans. Besides circulatory disturbances and a lack of oxygen supply, in the human body nitrite is classified as potentially carcinogenic. Due to this, monitoring is crucial for health and ecological reasons.

NO_X

NO_X is a sum parameter of nitrate (NO_3) and nitrite (NO_2).



ISE Sensors

The reliable and robust ISE sensors are measuring NH_4 and NO_3 continuously and in real-time without delays. The sensors increase process transparency and allow a dynamic and efficient control of nitrification and denitrification. The accuracy of the measurement is dependent on the measured medium. For compensation of this effect a matrix adjustment is necessary. You can benefit from our intuitive operation, which makes the adjustment as easy as possible! Our cross compensation enables the correction of several measured values with only one compensation electrode.

VARiON®*Plus* 700 IQ

- As easy as measuring pH
- Up to 18 month lifetime of electrodes
- Calibration-free, long stability
- No chemicals used

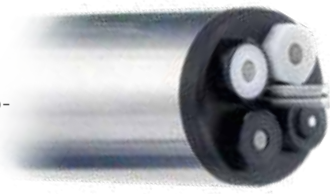
IP 68 · 2 Year Warranty · *D2.07, D2.08, D2.09*

Digital Sensors

To be connected to the digital, modular, and expandable IQ Sensor Net.

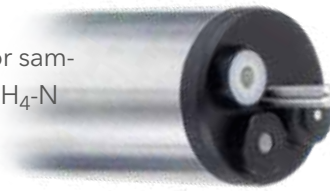
VARiON®*Plus* 700 IQ

Ion selective measurement of ammonium and nitrate, free of reagents with automatic compensation of potassium/chloride



AmmoLyt®*Plus* 700 IQ

Ammonium can be measured directly in the medium without sample preparation or sample transfer. Measurement of centrate and other process waters up to 2,000 mg/l NH_4-N



NitraLyt®*Plus* 700 IQ

Nitrogen elimination – transparent, process optimized, economical. Nitrate can be measured directly in the medium – optimized for regulation purposes

Ordering Information

Model	Description	Order No.
VARiON®*Plus* 700 IQ	Digital sensor for the ion selective measurement of ammonium and nitrate, without electrodes	107040
AmmoLyt®*Plus* 700 IQ	Digital sensor for ion selective measurement of ammonium	107070
NitraLyt®*Plus* 700 IQ	Digital sensor for the ion selective measurement of nitrate	107080

For technical data please see datasheets D2.07, D2.08 and D2.09

Alternatives and accessories see brochure "Product Details" and website

Information about IQ Sensor Net system see from page 48

Spectral nitrate/nitrite sensors see from page 32

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Electrodes

The electrodes for the digital ISE sensors convince with reliable measurements.

1 Year Warranty

IQ SENSOR NET

Reference electrode VARiON® Ref

for mounting into sensors VARiON®*Plus* 700 IQ, NitraLyt®*Plus* 700 IQ, AmmoLyt®*Plus* 700 IQ

Ammonium electrode VARiON®*Plus* NH_4

for mounting into sensors VARiON®*Plus* 700 IQ and AmmoLyt®*Plus* 700 IQ,
measuring range: 0.1 - 2,000 mg/l NH_4-N

Potassium electrode VARiON®*Plus* K

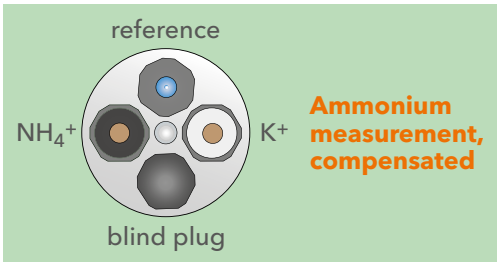
for mounting into sensors VARiON®*Plus* 700 IQ and AmmoLyt®*Plus* 700 IQ,
measuring range: 1 - 1,000 mg/l K^+

Nitrate electrode VARiON®*Plus* NO_3

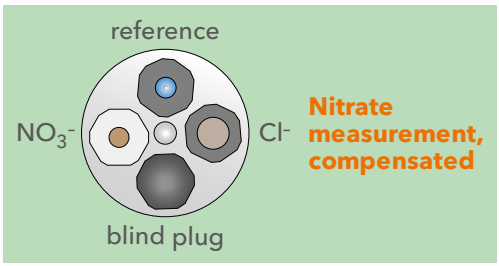
for mounting into sensors VARiON®*Plus* 700 IQ and NitraLyt®*Plus* 700 IQ,
measuring range: 0.1 - 1,000 mg/l NO_3-N

Chloride electrode VARiON®*Plus* Cl^-

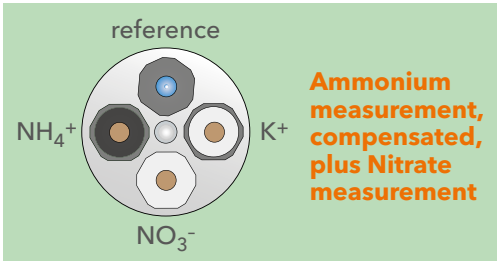
for mounting into sensors VARiON®*Plus* 700 IQ and NitraLyt®*Plus* 700 IQ,
measuring range: 1 - 1,000 mg/l Cl^-



(Possible) configuration of VARiON®*Plus* 700 IQ for ammonium measurement or AmmoLyt®*Plus* 700 IQ (without dummy plug)



(Possible) configuration of VARiON®*Plus* 700 IQ for nitrate measurement or NitraLyt®*Plus* 700 IQ (without dummy plug)



(Possible) configuration of VARiON®*Plus* 700 IQ for ammonium measurement dynamically compensated plus nitrate measurement (manuel compensation possible)

Ordering Information

Model	Description	Order No.
VARiON® Ref	Reference electrode for mounting into sensors VARiON®*Plus* 700 IQ/NitraLyt®*Plus* 700 IQ/ AmmoLyt®*Plus* 700 IQ	107042
VARiON®*Plus* NH_4	Ammonium electrode for VARiON®*Plus* 700 IQ and AmmoLyt®*Plus* 700 IQ/AmmoLyt®	107044
VARiON®*Plus* NO_3	Nitrate electrode for VARiON®*Plus* 700 IQ and NitraLyt®*Plus* 700 IQ/ NitraLyt®	107045
VARiON®*Plus* K	Potassium electrode for VARiON®*Plus* 700 IQ and for AmmoLyt®*Plus* 700 IQ	107046
VARiON®*Plus* Cl	Chloride electrode for VARiON®*Plus* 700 IQ and for NitraLyt®*Plus* 700 IQ	107047

Sets and accessories see brochure "Product Details" and website

Information about IQ Sensor Net system see from page 48

Spectral nitrate/nitrite sensors see from page 32

Ammonium analyzer see from page 34

UV-VIS and UV Spectral Sensors

UV-VIS spectral sensors represent a precise measuring technique with long-term stability and provide continuous recording of the selected parameters NO_3 and NO_2 in measuring cycles within minute range. The disturbance variables for optical measuring, such as turbidity/suspended solids, are eliminated by spectral recording. Thanks to integrated ultrasonic cleaning, a very long maintenance-free operation is possible.

Spectral sensor with multifunctional slide and Shock-Absorption-Rings

- Low maintenance due to integrated ultrasonic cleaning
- Measuring NO_2, NO_3 and more parameters
- No use of chemicals nor consumables

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Ordering Information

Model	Description	Order No.
NitraVis® 701 IQ	Spectral nitrate probe for the measurement in inlet/aeration with integrated ultrasonic cleaning, multifunctional slide and shock-absorption-rings, without connecting cable (order SACIQ separately)	481044
NitraVis® 705 IQ	Like NitraVis® 701 IQ, but for measuring in the outlet	481046
NitraVis® 701 IQ TS	Spectral nitrate and suspended solids probe for measuring in the inlet/aeration with integrated ultrasonic cleaning, multifunctional slide and shock-absorption-rings, without connecting cable (order SACIQ separately)	481045
NitraVis® 705 IQ TS	Like NitraVis® 701 IQ TS, but for measuring in the outlet	481047
NitraVis® 701 IQ NI	Spectral nitrate and nitrite probe for measuring in the inlet/aeration with integrated ultrasonic cleaning, multifunctional slide and shock-absorption-rings, without connecting cable (order SACIQ separately)	481056
NitraVis® 705 IQ NI	Like NitraVis®705 IQ NI, but for measuring in the drain/outlet	481057
NiCaVis® 705 IQ	Spectral UV-VIS probe for measuring nitrate, COD_{tot}, $COD_{diss.}$, TOC, BOD, DOC, $SAC_{tot.}$, $SAC_{diss.}$ and UVT_{254} in the drain/outlet with integrated ultrasonic cleaning, multifunctional slide and shock-absorption-rings, without connecting cable (order SACIQ separately)	481052
NiCaVis® 705 IQ TS	Like NiCaVis®705 IQ, but with TS	481053
NiCaVis® 705 IQ TS Co	like NiCaVis® 705 IQ TS, but with Color	481066
NiCaVis® 701 IQ NI	Spectral UV sensor for the measurement of nitrite. nitrate. $COD_{tot.}$, $COD_{diss.}$, TOC, BOD, DOC, $SAC_{tot.}$, $SAC_{diss.}$, UVT_{254} in the inlet and in the aeration with integrated ultrasonic cleaning. multifunctional slide and shock-absorption-rings. without connecting cable (order SACIQ separately)	481054
NiCaVis® 705 IQ NI	Like NiCaVis® 701 IQ NI. but for the measurement in the drain/outlet	481055
UV 701 IQ NOx	Optical nitrate (NOx) sensor to measure higher concentration with integrated ultrasonic cleaning, multifunctional slide and shock-absorption-rings, without connecting cable (order SACIQ separately)	481034
UV 705 IQ NOx	Like UV 701 IQ NOx, but to measure low concentrations	481035
NiCaVis® 705 IQ SF	Spectral UV-VIS sensor (60 mm) for the measurement of Nitrate, COD, TOC, BOD, DOC, SAC, UVT_{254} and TS in surface water bodies with integrated ultrasonic cleaning.	481058
NiCaVis® 705 IQ SF Co	like NiCaVis® 705 IQ SF, but with Color	481060
NiCaVis® 705 IQ NI SF	Spectral UV-VIS sensor (60 mm) for the measurement of Nitrate, Nitrite, COD, TOC, BOD, DOC, SAC, UVT_{254} and TS in surface water bodies with integrated ultrasonic cleaning.	481059

For technical data please see datasheets D2.10 to D2.14 and D2.26

Alternatives and accessories see brochure "Product Details" and website

Information about IQ Sensor Net system see from page 48

CarboVis® spectral sensors for determination of carbon parameters see page 38

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Parameter / Sensoren	NitraVis® 701 IQ	NitraVis® 705 IQ	NitraVis® 701 IQ TS	NitraVis® 705 IQ TS	NitraVis® 701 IQ NI	NitraVis® 705 IQ NI	NiCaVis® 705 IQ	NiCaVis® 705 IQ TS	NiCaVis® 705 IQ TS Co	NiCaVis® 701 IQ NI	NiCaVis® 705 IQ NI	UV 701 IQ NOx	UV 705 IQ NOx	NiCaVis® 705 IQ SF	NiCaVis® 705 IQ SF Co	NiCaVis® 705 IQ NI SF	CarboVis® 701 IQ	CarboVis® 705 IQ	CarboVis® 701 IQ TS	CarboVis® 705 IQ TS	CarboVis® 705 IQ TS Co	UV 701 IQ SAC	UV 705 IQ SAC	ColorVis 705 IQ
Usable with System 2020 3G and 282/284	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Parameter																								
TSS (optical)			●	●				●	●										●	●	●			
Color (optical)									●						●						●			●
Nitrate (optical/spectral)	●	●	●	●	●	●	●	●	●	●	●			●	●	●								
Nitrite (optical/spectral)					●	●				●	●					●								
NO_X (optical/spectral)†												● *	● *											
COD (optical/ spectral)							●	●	●	●	●			●	●	●	●	●	●	●	●			
BOD (optical/spectral)							●	●	●	●	●			●	●	●	●	●	●	●	●			
TOC (optical/spectral)							●	●	●	●	●			●	●	●	●	●	●	●	●			
DOC (optical/spectral)							●	●	●	●	●			●	●	●	●	●	●	●	●			
SAC_{254} (optical/spectral)							●	●	●	●	●			●	●	●	●	●	●	●	●	● *	● *	
UVT_{254} (optical/spectral)							●	●	●	●	●			●	●	●	●	●	●	●	●	● *	● *	

** Gap size for inlet and outlet depends on concentrations*
† Nitrite and Nitrate are included in the measured value

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Analyzers

The wet chemical analyzer **Alyza IQ NH_4** provides precise results due to its revolutionary MultiPort Valve. Further on, the instrument requires extremly low amounts of liquids..

Ammonium measurement with Alyza IQ NH_4 (Indophenol method acc. to DIN 38 406) for wastewater plant effluent and river monitoring.

- Minimized reagent consumption and waste
- Extremely low maintenance
- No service contract required
- High accuracy at low measuring ranges

IP 67 IP 54 · 2 Year Warranty · TD D2.25

IQ SENSOR NET

Alyza IQ NH_4 one-channel version with open measuring unit and visible photometer

Ammonium Analyzer Alyza IQ NH_4

For integration into the digital, modular and expandable IQ Sensor Net

Alyza IQ NH_4-110

1-channel version with 2 measuring ranges; without pump

Alyza IQ NH_4-111

1-channel version with 2 measuring ranges; with 1 pump

Alyza IQ NH_4-112

2-channel version with 2 measuring ranges; with 2 pumps

Ordering Information

Model	Description	Orderno.
Alyza IQ NH_4-110	Ammonium analyzer Alyza IQ NH4 for the IQ Sensor Net, Measurement range 1 and 2, 1-channel w/o pump. Scope of delivery: Ammonium analyzer for indoor and outdoor use, spare parts for the first year, pre-installed 2 m SNCIQ and power cable (please order controller and reagents separately).	825010
Alyza IQ NH_4-111	Ammonium analyzer Alyza IQ NH4 for the IQ Sensor Net, Measurement range 1 and 2, 1-channel with pump. Scope of delivery: Ammonium analyzer for indoor and outdoor use, spare parts for the first year, pre-installed 2 m SNCIQ and power cable (please order controller and reagents separately).	825011
Alyza IQ NH_4-112	Ammonium analyzer Alyza IQ NH4 for the IQ Sensor Net, Measurement range 1 and, 2-channel with two pumps. Scope of delivery: Ammonium analyzer for indoor and outdoor use, spare parts for the first year, pre-installed 2 m SNCIQ and power cable (please order controller and reagents separately).	825012

For technical data please see datasheet D2.24

Reagents and accessories see brochure "Product Details" and website

Information about IQ Sensor Net system see from page 48

Further analyzer see from page 61

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