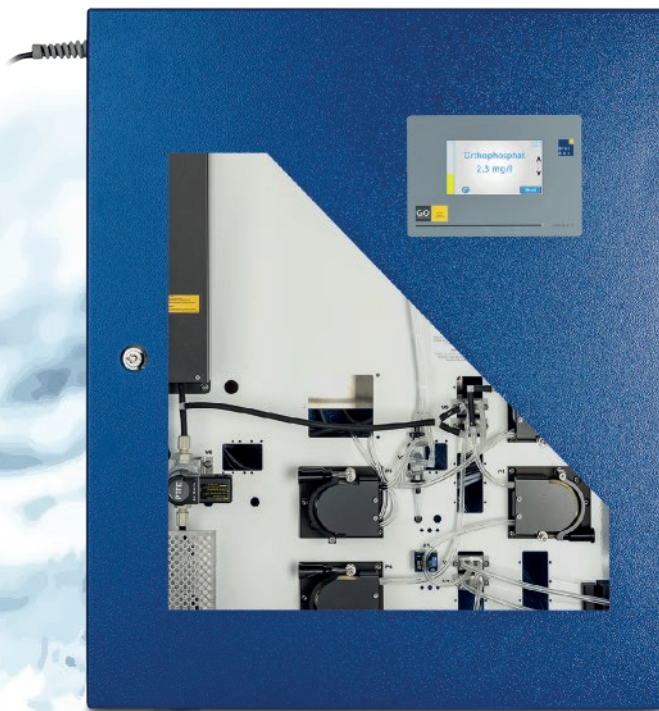




Overview Colorimetry Solutions by GO Systemelektronik



Introduction Colorimetry



Sample Preparation



General Measurement Procedure



Parameters & Measurement Ranges



Function & Features



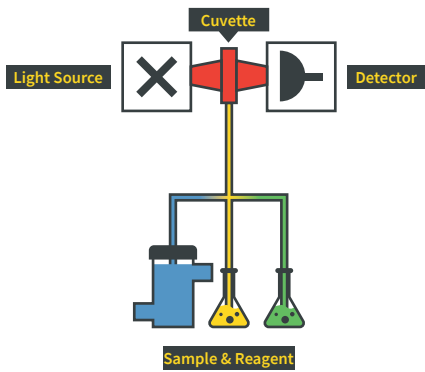
BlueMon Product Solutions



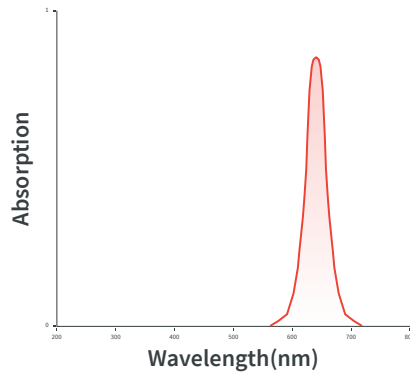
Introduction Colorimetry

If you mix water with chemicals, different effects can occur depending on the mixture. In colorimetry, these effects are used to determine a parameter. The addition of reagents causes a color change or a change in the absorption behavior of the sample. For measurement, light of a certain wavelength is radiated onto the sample and the absorption of this light is measured in transmitted light. The concentration of the substance to be measured can then be calculated directly from the absorption.

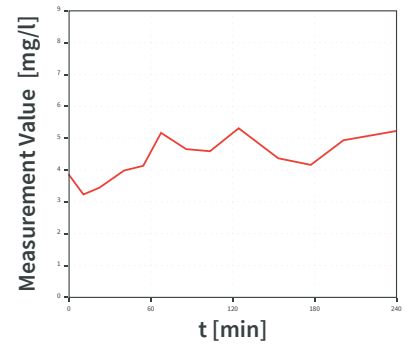
Chemical Reaction



Measurement of Absorption

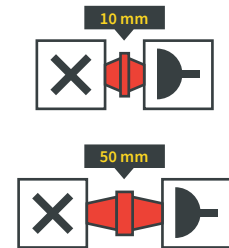


Determination of Concentration



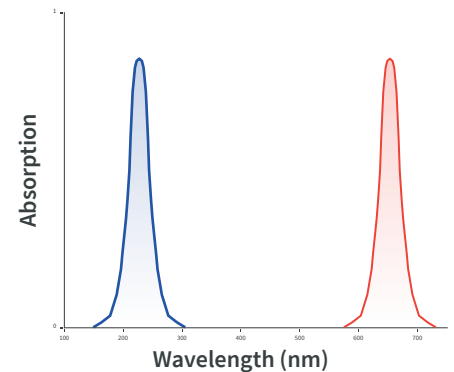
Cuvette Size

During photometric measurement, the cuvette serves as a sample container through which the light is radiated. In addition to the chemical reaction, the correct light source and the appropriate detector, the path length of the cuvette is also important. High concentrations lead to high absorption and therefore require a small path length. Low concentrations, on the other hand, require a longer path length in order to obtain ideal measurement results. By using different cuvette sizes it is possible to cover different measuring ranges.



Wavelengths

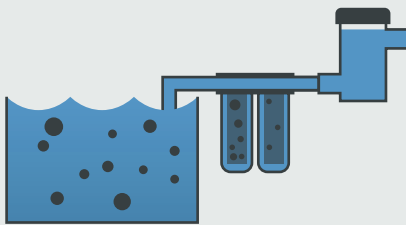
The chemical method used is parameter-specific. These differ not only in the reagents used, but also in the optical behavior of the sample after the chemical reaction. Therefore, depending on the parameter, a specific wavelength is used in the photometric measurement to determine the absorption of the sample. For example, total phosphorus is measured at 643 nm and total nitrogen at 230 nm.



Sample Preparation

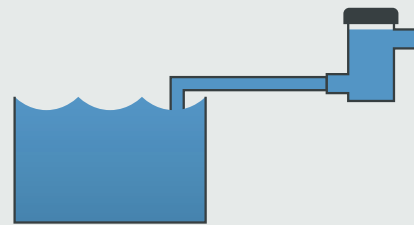
Before mixing the medium with chemicals, it is important to ensure that only particles that can be pumped through the entire flow path without causing blockages get into the BlueMon Analyser. Therefore, depending on the medium, it may be necessary to install a filtration upstream of the analyser. The required particle size depends on the respective parameter. For example, TP should not be filtered too strongly, otherwise no representative measurement is possible.

Filtration Necessary



Particle size $>30\ \mu\text{m}$
For TP $>100\ \mu\text{m}$

No Filtration Necessary



Particle size $\leq 30\ \mu\text{m}$
For TP $\sim 100\ \mu\text{m}$



General Measurement Procedure

The sequence program of the BlueMon Analysers is specific for each parameter. The various subprograms are started and repeated cyclically. If required, the sequence of the program can be individually adapted and optimized to the local conditions. In the simplest case, the calibration and cleaning intervals can be adjusted. In addition, if several measuring channels are used, it is easy to determine when and how often each channel is measured. Even more complex adjustments such as the integration of a customer-specific program are possible without any problems.

Sequence program 1:



Sequence program 2:



Sequence program 3:

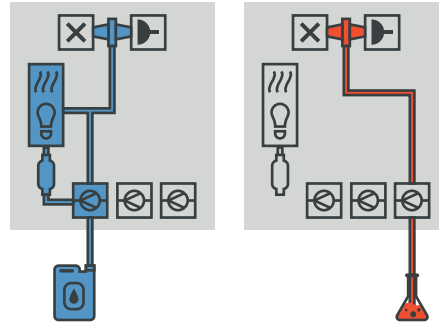


Sample Sequence for the Measurement of TP & OP

Calibration and Cleaning

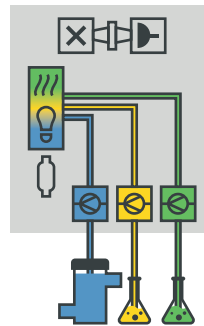
The calibration of the BlueMon is an automated process. To ensure the measurement accuracy, the calibration is continuously monitored. Should the calibration fail for example due to contamination, it is repeated. If this happens several times in a row, the operator is alerted.

In addition, the BlueMon Analyser has an automated cleaning cycle that can be adapted according to the application. Thus negative effects of contamination or carry-over can be eliminated.



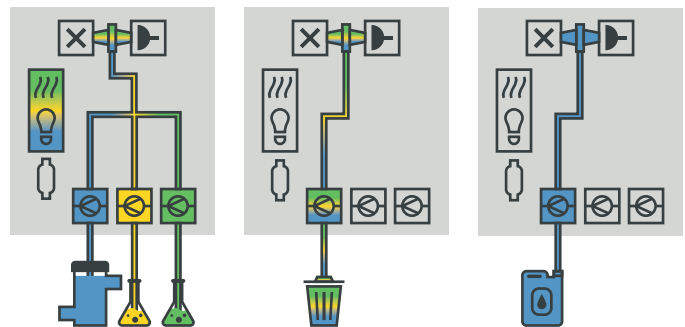
Digestion of Total Phosphorus

First, the sample is pumped together with the necessary reagents into a digestion vessel. In this container, the mixture is irradiated with UV light and heated during this process. This converts the free and bound phosphorus into orthophosphate (OP). The mixture is then pumped into a sample container where it cools down.



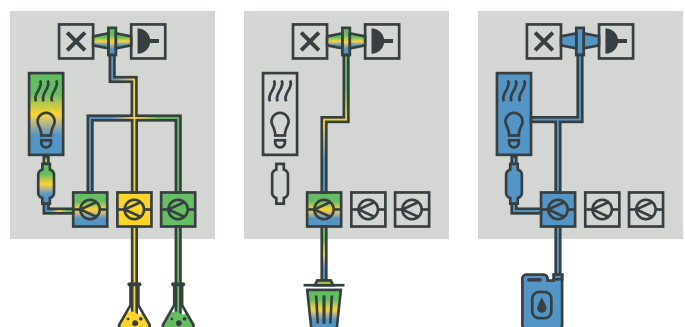
Measurement of Orthophosphate

During the sample digestion the measurement of orthophosphate is carried out. For this purpose, a water sample with the corresponding reagents is pumped directly into the cuvette. The water reacts with the reagents, causing the mixture to change color. In the photometer, the intensity of this color is measured and the concentration of orthophosphate is calculated. The sample is then pumped into the drain and the BlueMon Analyser is cleaned.



Measurement of Total Phosphorus

The prepared sample is pumped from the sample vessel into the photometer and mixed with additional reagent. Again the color change is measured, the concentration calculated and the sample discarded. The BlueMon Analyser is finally cleaned and ready for the next measuring cycle of total phosphorus and orthophosphate.



Parameters & Measurement Ranges

Colorimetric analyzers are primarily used when high measurement accuracy is required for the application. This ensures maximum process reliability or reliable measurements even in the lowest concentrations to verify compliance with limit values.

With the BlueMon Analysers from GO Systemelektronik it is possible to determine a number of different parameters and concentrations. The BlueMon Analyser is available for the determination of single parameters as well as a combination instruments for several parameters. With combined instruments, the respective measuring ranges must be compatible with each other in order to be able to measure the different parameters with the same cuvette.

Parameter	Measurement Range	Unit	Accuracy *	DIN Method Norm
NH₄ Ammonium	0.0 - 1 / 0.0 - 2 / 0.0 - 10 / 0.0 - 20	mg/l	3% FS	DIN 38406-5 (Indophenol Blue Method)
PO₄ Orthophosphate	0.0 - 1 / 0.0 - 2 / 0.0 - 10 / 0.0 - 20	mg/l	3% FS	DIN EN ISO 6878 (Molybdenum Blue Method) or Vanadate Yellow Method depending on measuring range
TP Total Phosphorus	0.0 - 1 / 0.0 - 2 / 0.0 - 10 / 0.0 - 20	mg/l	3% FS	DIN EN ISO 6878 (Molybdenum Blue Method)
PO₄ & TP Orthophosphate & Total Phosphorus	0.0 - 1 / 0.0 - 2 / 0.0 - 10 / 0.0 - 20	mg/l	3% FS	DIN EN ISO 6878 (Molybdenum Blue Method)
TN Total Nitrogen	0.0 - 5 / 0.0 - 50	mg/l	3% FS	DIN EN ISO 11905
TN & TP Total Nitrogen & Total Phosphorus	TP: 0.0 - 10 + TN: 0.0 - 50 TP: 0.0 - 1 + TN: 0.0 - 6	mg/l	TP: 3 % FS TN: 5 % FS	DIN EN ISO 6878 (Molybdenum Blue Method) and DIN EN ISO 11905
TN, TP, NH₄ & NO_x Total Nitrogen, Total Phosphorus, Ammonium & Nitrogen Oxide	TN: 0.0 - 5 + TP: 0.0 - 2 + NH ₄ : 0.0 - 1, NO _x : 0.0 - 5	mg/l	TP, NH ₄ : 3 % FS TN, NO _x : 5 % FS	DIN 38406-5 (Indophenol Blue Method), DIN EN ISO 6878 (Molybdenum Blue Method), DIN EN ISO 11905

* The measuring accuracy refers to the entire measuring range (FS=Full Scale)

Application Areas



Wastewater

Influent, Biology, & Effluent of WWTP:

NH₄, PO₄, TP, TN, NO_x

Industrial Wastewater:

NH₄, PO₄, TP, TN

Sewage network:

NH₄, PO₄, TP, TN



Drinking Water

Drinking water plant:

NH₄, PO₄, TP, TN

Drinking water network:

NH₄, PO₄, TP, TN



Environmental Monitoring

Lakes & River Monitoring:

NH₄, PO₄, TP, TN, NO_x

Sea water Monitoring:

NH₄, PO₄, TP, TN, NO_x



Process Monitoring

Influent of industrial plants:

NH₄, PO₄, TP, TN

Process of industrial plants:

NH₄, PO₄, TP, TN

Functions & Features - BlueMon Analysers



Monitoring Function

The BlueMon Analysers allow the determination of parameters in low concentration ranges and have a high measuring accuracy.



Configurable Measurement Procedure

With the corresponding software, the sequence program of the BlueMon Analysers can be configured according to the specific application requirements.



Automatic Calibration

All BlueMon Analysers are equipped with automated calibration. To ensure accuracy, the calibration is continuously monitored. If the calibration is not successful several times, an alarm is automatically triggered.



Up to 6 Measuring Channels

The BlueMon Analyser enables the integration of up to 6 measuring channels. Thus different sample streams can be measured with only one instrument.



Automatic Cleaning

The BlueMon Analysers have an automatic and programmable cleaning function. The cleaning process can thus be started automatically after each measuring cycle.



Measurement according to DIN Methods

The measuring methods of the BlueMon Analysers are based on the recognized DIN standards of the respective parameters.



Control Function (PLC)

The BlueMon Analysers are equipped with a comprehensive control functionality that makes it possible to easily manage processes of all sizes, from simple switching of a valve to more complex industrial applications.



Remote Access & Control

A connection via internet or mobile networks facilitates the transmission of measurement data and results at any time and allows for remote access and control of the system. Thereby it is possible to change settings or transmit calibrations remotely.



Cloud Daten Service (BlueGate)

The BlueGate cloud data service automatically backs up all data and provides remote access via any web browser. The service offers a live data view, visualisations, and the ability to export all measurement data. BlueGate also allows to set up alarms such as notifications for the exceedance of thresholds. All communications over public networks between BlueMon - BlueGate - and customer systems are encrypted.

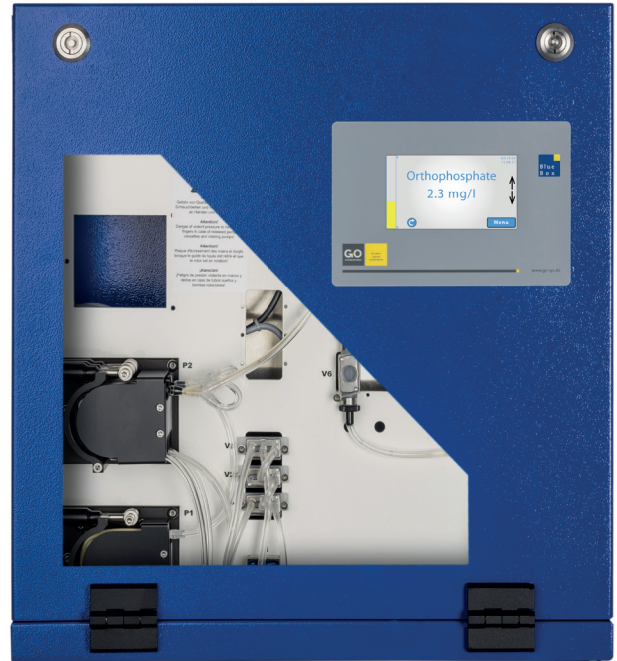


Intelligent Event-Handling

With the help of the flexible communication possibilities of the BlueMon System it is possible to transmit events locally or via telephone, network, mobile network, and satellite, if required through redundant paths, in a swift and reliable manner. All usual services like SMS, email, FAX and network protocols are available for the transmission. Response times for alarms and events can thereby be minimized and the reliability of operation can be optimized.

BlueMon On-line Analyser

The **BlueMon** analyser is a powerful measurement device for wet-chemical on-line analysis methods. The analyser allows for a fully automated and self-calibrating operation of up to six sample lines. Thereby it enables the on-line monitoring of parameters that previously required time-consuming and costly manual lab work. The BlueMon Analyser also features extensive control functions, as well as the possibility for remote access and control via internet and mobile networks.



Application Areas



Drinking Water

- Quality control
- Alarm systems



Wastewater

- Effluent monitoring
- Trend analysis



Process Measurement & Control Technology

- Process monitoring in industrial facilities
- Control of process water treatment
- Process optimization



Environmental Monitoring

- River water
- Surface water

Parameters

- Ammonium
- Chlorine
- Orthophosphate
- Total phosphorus (TP)
- Total nitrogen (TN)
- Total nitrogen & total phosphorus (TN/TP)
- Silica

* Further parameters on request

Main Functions



Monitoring Function



Control Function (PLC)



Automated Calibration



Up to 6 Measuring Channels



Intelligent Event Handling



Cloud Data Service



Configurable Measurement Procedure



Automated Cleaning

Technical data

Power supply 230 VAC (90 - 260 V)

Power consumption (typical) 42 W

Dimensions (wxhxd)

Art. no. 488 1xxx 45 x 48 x 26 cm

Art. no. 488 2xxx 60 x 70 x 30 cm

IP protection class IP 54 / IP 65 [optional]

Number of measuring channels 2 / up to 6 [optional]

Sample pressure 0 bar (max. 0.05 bar overpressure)

Sample temperature +10 to +40 °C

Ambient temperature +15 to +35 °C

Interfaces

1x RS-232, RS-485, var. protocols e.g. Modbus

1x CAN bus for connection of additional modules, sensors & actuators

1x Ethernet [TCP/IP], Modbus [TCP/IP]

Profibus [optional]

GPRS / UMTS / LTE modem [optional]

Inputs

1x Current input 4-20 mA

4x Digital-In (static) potential-free contacts

1x Connection for pH glass electrode

1x Connection for temperature (PT1000) 0-80 °C

1x Connection for Redox/ORP electrode

1x Connection for leakage sensor

Outputs

2x Current output 4-20 mA

4x Digital-Out

6x Relay with a switching capacity of 24 V AC/DC; 0,5 A

Silica

Measuring principle photometric

Measuring range 0.0 - 0.02 / 2.0 / 100 mg/l

Art. no. 488 1FS0

Orthophosphate

Measuring principle photometric

Measuring range 0.0 - 0.5 / 2.0 / 6.0 / 25 / 50 mg/l

Art. no. 488 1FP0

Total nitrogen

Measuring principle photometric

Measuring range 0.0 - 0.5 / 10 mg/l

Art. no. 488 2FN1

Ammonium

Measuring principle photometric

Measuring range 0.0 - 0.5 / 4.0 / 8.0 / 20 / 100 mg/l

Art. no. 488 1FA0

Orthophosphate & total phosphorus

Measuring principle photometric

Measuring range 0.0 - 0.1 / 0.5 / 6.0 / 100 mg/l

Art. no. 488 2FP1

Total nitrogen & total phosphorus

Measuring principle photometric

Measuring ranges 0.0 - 2.0 TN 0.0 - 1.0 TP mg/l

0.0 - 5.0 TN 0.0 - 2.0 TP mg/l

0.0 - 10 TN 0.0 - 5.0 TP mg/l

0.0 - 50 TN 0.0 - 10 TP mg/l

Art. no. 488 2TPN

Chlorine

Measuring principle photometric

Measuring range

free, combined & residual chlorine 0.0 - 0.2 / 1.0 / 3.0 mg/l

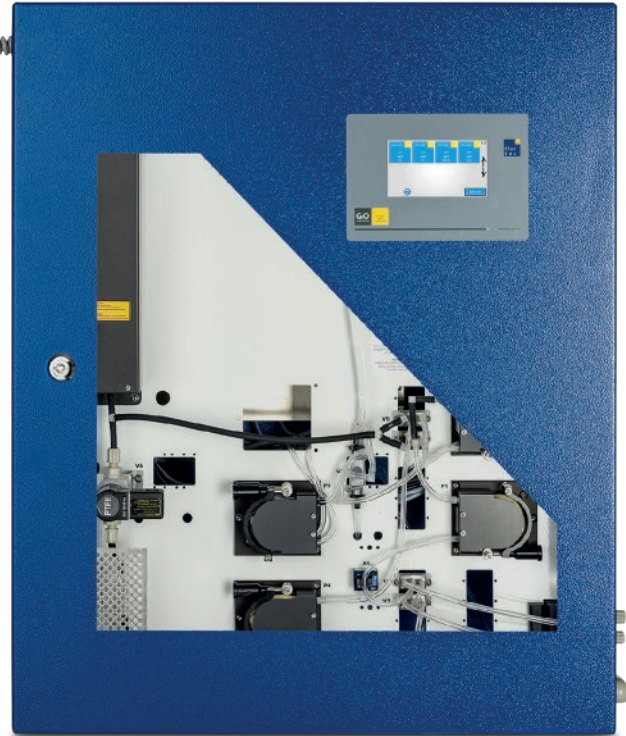
Art. no. 488 1FC0

*Further parameters on request

BlueMon Nutrient Analyser

The **BlueMon Nutrient Analyser** offers a combined solution for the on-line measurement of TN, TP, NH4 & NOx all with one single device.

The BlueMon analyser is a powerful measurement device for wet-chemical on-line analysis methods. The analyser allows for a fully automated and self-calibrating operation of up to four sample lines. The BlueMon Analyser also features extensive control functions, as well as the possibility for remote access and control via internet and mobile networks.



Application Areas



Wastewater

- Effluent monitoring
- Trend analysis



Environmental Monitoring

- River water
- Surface water



Aquacultures

- Hatcheries
- Onshore & offshore fish farms

One Analyser — 4 Parameters

- Total nitrogen (TN)
- Total phosphorus (TP)
- Ammonium (NH4-N)
- Nitrogen dioxide (NOx)

Main Functions



Monitoring Function



Control Function (PLC)



Automated Calibration



Up to 4 Measuring Channels



Intelligent Event Handling



Cloud Data Service



Configurable Measurement Procedure



Automated Cleaning

Technical data

Power supply	230 VAC (90 - 260 V)
Power consumption (typical)	42 W
Dimensions (wxhxd)	60 x 70 x 30 cm
IP protection class	IP 54 / IP 65 [optional]
Number of measuring channels	2 / up to 4 [optional]
Sample pressure	0 bar (max. 0.05 bar overpressure)
Sample temperature	+10 to +40 °C
Ambient temperature	+15 to +35 °C

Interfaces

1x RS-232, RS-485, var. protocols e.g. Modbus

1x CAN bus for connection of additional modules, sensors & actuators

1x Ethernet [TCP/IP], Modbus [TCP/IP]

Profibus [optional]

GPRS / UMTS / LTE modem [optional]

Inputs

1x Current input 4-20 mA

4x Digital-In (static) potential-free contacts

1x Connection for pH glass electrode

1x Connection for temperature (PT1000) 0-80 °C

1x Connection for Redox/ORP electrode

1x Connection for leakage sensor

Outputs

2x Current output 4-20 mA

4x Digital-Out

6x Relay with a switching capacity of 24 V AC/DC; 0,5 A

Total nitrogen

Measuring principle	spectrophotometric
Measuring range*	0.0 - 5.0 mg/l
Measuring accuracy	± 5 %

Total phosphorus

Measuring principle	spectrophotometric
Measuring range*	0.0 - 2.0 mg/l
Measuring accuracy	± 3 %

Ammonium

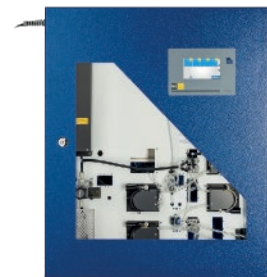
Measuring principle	photometric
Measuring range*	0.0 - 1.0 mg/l
Measuring accuracy	± 3 %

Nitrogen oxide

Measuring principle	spectrophotometric
Measuring range*	0.0 - 5.0 mg/l
Measuring accuracy	± 5 %

Product configuration

The BlueMon Nutrient Analyser is designed to measure every parameter with a measurement interval of 60 minutes.



BlueMon Nutrient Analyser

Art. no. 488 2PNA

*Further measuring ranges on request

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WE MAKE
LIQUIDS
TRANSPARENT.

