UV400
Online Water Analyser

TETHYS INSTRUMENTS

Specialist Of UV Spectroscopy

> UV400 Online Water Analyser

The UV400, based on a modular concept, allows to monitor simultaneously many different parameters for waste water or drinking water treatment plants as well as river monitoring stations. Each parameter corresponds to a specific optical module that can be selected by the user while ordering the analyser, depending on the application.

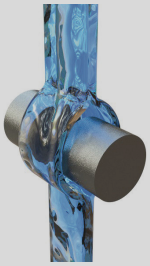
Mainly based on UV spectroscopy, well known for its stability and low operating cost, the UV400 can measure parameters like organic matter, ammonia, nitrate, aromatics hydrocarbons (PAH), colour, hydrogen sulphide and chlorophyll A. Complementary modules allows the measurement of phosphate by colorimetric method and turbidity by a visible or infra-red laser diode.

External probes can be added for physicochemical parameters like pH, ORP, dissolved oxygen, conductivity and turbidity.
Thanks to its automatic cleaning system and its extremely long life time lamp, the maintenance is roughly limited to the periodic refill of the inexpensive cleaning solution and eventually reagents depending on the parameters.

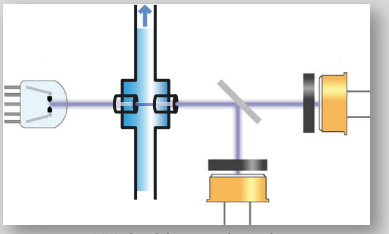
A new web-based interface allows the control and the troubleshooting at distance using an internet browser on computer, tablet or i-phone.

UV-visible Spectroscopy

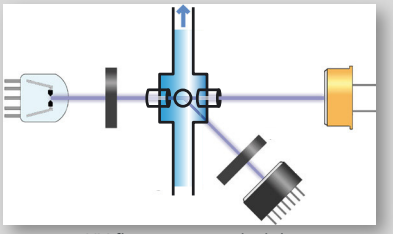
- Most of the measurements (UV254, NH4, H2S, NO3, Colour, PO4, PAH, Chlorophyll A) are based on the UV-VIS spectroscopy that brings fast and stable measurements with a simple hydraulic circuit for a high reliability.
- All the measurements are done within 5 seconds except PO4, NH4 and H2S that require about 3 minutes.
- The patented flow cell allows very high level of suspended solid without clogging. The turbidity of the sample is automatically compensated by a dual-wavelength method as shown on the figure.
- The UV source is a xenon flash lamp specified for 10^9 flashes that corresponds to more than 10 years of life time with one measurement every minute.
- Physico-chemical measurements (pH, ORP, Dissolved oxygen, Conductivity) can be added to the internal measurements by using external probes. The dissolved oxygen probe is based on fluorescence method for a lower maintenance and higher stability.
- Three external turbidity probes (high, medium and low range) are also available if the measurement need to be done in situ, for example before filtering.



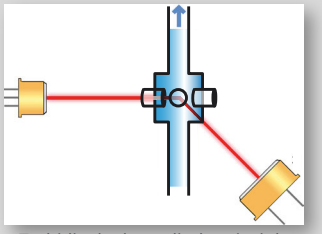
Patented clogging-free flow cell



UV double wavelength absorbance principle

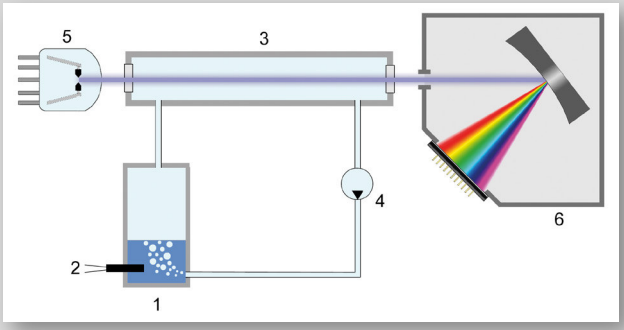


UV fluorescence principle



Turbidity by laser diode principle

*Ammonia and Hydrogen Sulphide: a **UNIQUE method***



1: stripping pot, 2 : temperature probe, 3 : gas flow cell, 4 : gas pump, 5 : xenon flash lamp, 6 : spectrograph

The ammonia and hydrogen sulphide measurement are based on the UV absorption of the ammonia gas or hydrogen sulphide gas after a stripping phase.
Consequently, the turbidity or colour of the sample has absolutely no influence and measurements can even be carried on activated sludge.

The ammonia gas has a typical periodic absorption spectrum that is analysed using a fast Fourier transform (FFT) that brings an exceptional selectivity. No interference has ever been reported after years of operation on many different applications.
A small quantity of NaOH solution is added to the sample for ammonia, or hydrochloric acid for hydrogen sulphide.

Communication

The RS232 port supports the MODBUS protocol to transmit each measuring channel value to a SCADA system.

Additional parameters are available like status code, error code, calibration values and pumps run time. Basic 4-20 mA output modules can be plugged on the main board for each measuring channel, in the limit of 12 modules. A USB port enables to download on any USB key the last 5000 recorded measurements as well as a diagnostic file containing the configuration and useful information for remote troubleshooting.

The new web interface makes possible to drive remotely the analyser from any computer, tablet or i-phone with a web browser. For this, an optional Wi-Fi or Ethernet module is added inside the analyser to connect it to an existing network with an internet gateway.

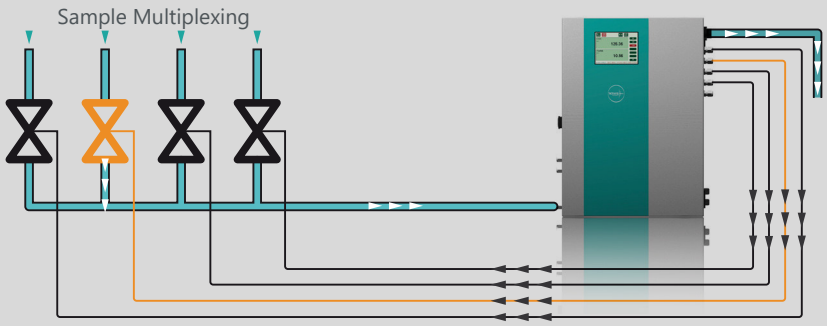
The recorded measurements file can be imported to Excel for graphs or other treatments.
The software of the analyser can be upgraded by connecting a USB key.

Multiplexing *system*

When different streams need to be analysed, for example inlet and outlet of a plant, an optional multiplexing system delivers relay contacts to control external electric-valves or external pumps.

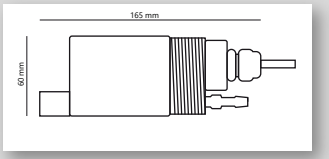
Up to 6 different streams can be selected

The measuring channels can be either duplicated (each one having its own 4-20mA output or MODBUS register), or measured sequentially to fit with the maximum of 16 measuring channels (a MODBUS register tells which stream is currently being measured).

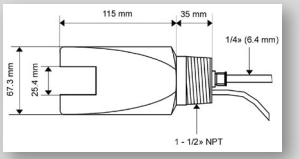


Robust *Industrial Probes*

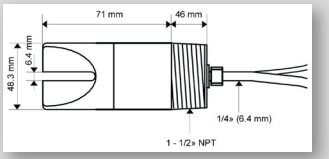
All the probes are specially designed for harsh environments with high level of suspended solid.



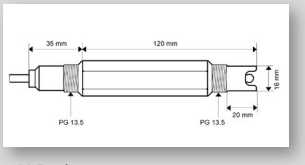
Turbidity Probe Low Range



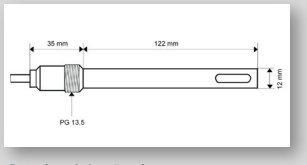
Turbidity Probe Medium Range



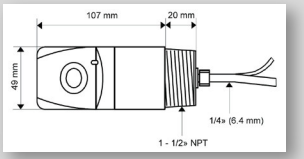
Turbidity Probe High Range



pH Probe



Conductivity Probe

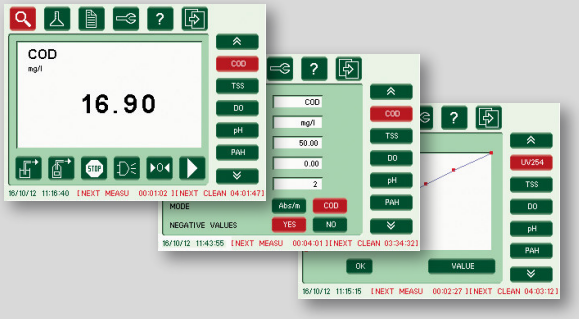


Dissolved Oxygen Probe

User-Friendly ***Interface***

The colour touch screen and intuitive interface available in 8 different languages (Chinese, English, French, German, Italian, Portuguese, Spanish, Turkish) makes very easy to test or configure the analyser.

Many test functions allows to test and troubleshoot each element of the analysers (light signal, pumps, solenoid valves, etc...) to setup quickly a maintenance diagnostic.



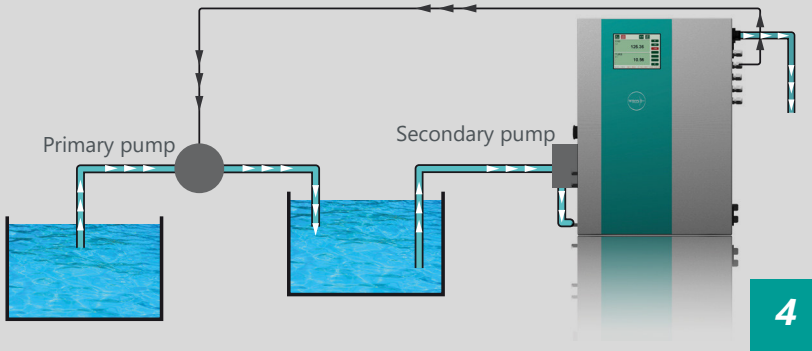
Sampling System

The UV400 can adapt to many different kind of sampling depending of the application : surface water, drinking water, process water or wastewater.

If the water is already pressurized, the sample can be admitted directly inside the analyser with a maximal pressure of 4 bars. Otherwise an optional built-in peristaltic pump, synchronised with the measurement to extend the tubing life time, allows to take the sample directly from a tank located up to 6 meters below the analyser.

For demanding applications with long distances, another peristaltic pump in a separate enclosure is proposed as an option. For some applications on river water or wastewater where two sampling pumps are necessary, the UV400 delivers a relay contact to synchronise the primary pump. The delay and running time of each pump can be adjusted easily in the parameters menu of the analyser.

In case filters are used in the sampling system, the UV400 is also able to provide a relay contact to clean the filter synchronised with the measurements.



> UV400 Parameters Specifications

Parameter	Standard range Other ranges on request	Typical Repeatability For low values (<10% FS)	Accuracy On standard solution
UV254	0-200 Abs/m 0-600 Abs/m 0-2000 Abs/m	+/- 0.05 Abs/m +/- 0.15 Abs/m +/- 0.5 Abs/m	+/- 2%
COD by UV correlation	0-100 mg/l COD 0-2000 mg/l COD 0-20000 mg/l COD	+/- 0.05 mg/l COD +/- 1 mg/l COD +/- 10 mg/l COD	+/- 2%
BOD by UV correlation	0-100 mg/l BOD 0-1000 mg/l BOD 0-10000 mg/l BOD	+/- 0.05 mg/l BOD +/- 0.5 mg/l BOD +/- 5 mg/l BOD	+/- 2%
TOC by UV correlation	0-100 mg/l TOC 0-1000 mg/l TOC 0-10000 mg/l TOC	+/- 0.05 mg/l TOC +/- 0.5 mg/l TOC +/- 5 mg/l TOC	+/- 2%
Nitrate	0-100 mg/l NO3	+/- 0.1 mg/l NO3	+/- 2%
Colour	0-100 pt/Co 0-1000 pt/Co	+/- 1 Pt-Co +/- 2 Pt-Co	+/- 2%
PAH (aromatics)	0-10 mg/l C6H6	+/- 0.01 mg/l C6H6	+/- 2%
Oil in water	0-100 ppm OIW 0-1000 ppm OIW	+/- 0.1 ppm OIW +/- 1 ppm OIW	+/- 2%
Chlorophyll A	0-100 µg/l ChlA	+/- 1 µg/l ChlA	+/- 2%
Phosphate	0-2 mg/l P-PO4 0-20 mg/l P-PO4	+/- 0.01 mg/l P-PO4 +/- 0.1 mg/l P-PO4	+/- 5%
Ammonia	0-100 mg/l NH4	+/- 0.2 mg/l NH4	+/- 2%
Hydrogen Sulphide	0-20 mg/l H2S	+/- 1 mg/l H2S	+/- 2%
Turbidity (TSS by correlation)	0-100 NTU 0-1000 NTU	+/- 0.1 NTU +/- 1 NTU	+/- 2%
pH	0-14	+/- 0.01 pH	+/- 2%
ORP	+/-2000 mV	+/- 1 mV	+/- 2%
Dissolved oxygen	0-25 mg/l O2	+/- 0.1 mg/l O2	+/- 2%
Conductivity	0-2000 µS	+/- 1 µS	+/- 2%
External turbidity (TSS by correlation)	0-4 NTU 0-40 NTU		
External TSS	0-1500 mg/l TSS 0-30000 mg/l TSS	+/- 1% of reading or +/- 2 mg/l TSS +/- 1% of reading or +/- 2 mg/l TSS	
Temperature	0-80°C	+/- 0.1 °C	+/- 2%

> UV400 General Specifications

Sample flow	Recommended: 0 - 5 l/min 0 - 0.5 l/min for NH4 or H2S
Sample pressure	0 - 4 Bar (0 - 1 Bar with sampling peristaltic pump) 0 - 0.5 Bar for NH4 or H2S
Sample temperature	0 - 80 °C 0 - 30 °C for NH4 or H2S
Wet parts materials	Quartz, Polypropylene, Polyethylene, FPM (viton), PMMA (+ pharmed and glass for NH4 or H2S)
Measuring time	5 sec (Except PO4, NH4, H2S : 3mn)
Measurement interval	1 min to 720 min (except PO4, NH4, H2S : 4mn. PhysicoChemical parameters may be continuous
Memory	5000 lines of measurements (up to 16 channels) with date and time
Consumption	Cleaning solution (5% sulfuric acid): 220 ml/day Reagent per measurement : 2 ml per measurement / NaOH 10% for NH4: 2 ml per measurement / HCl 10% for H2S: 2 ml per measurement
Maintenance interval	Recommended: 6 months to 1 year (except for refilling)
Power supply	90 - 264 VAC 50/60 Hz 40 VA - 12v DC 3A maxi (except for NH4 or H2S)
Screen	Colour TFT LCD 320x240 pixels with LED backlight
Communication	RS232, Modbus or HTTP/Web interface, compatible with Windows7, with Internet Explorer version 9, Nexus 7 tablet under Android with Opera version 12.10, Apple I-phone 4S with Safari RS485 for external probes (DO, TSS) USB WI-FI (IEEE802.11B) optional Ethernet (IEEE802.3) optional
Certifications	CE, EN 61010-1, EN 61326
Enclosure	Stainless Steel with epoxy coating, IP54 (IP65 as option), wall mounting brackets
Dimensions	520 x 390 x 220 mm
Weight	20 to 30 kg depending on the configuration

> UV400 Parts references

Basic unit

UV400 — ***Basic unit (no measurement included)***
Color graphic display 320x240 pixels with touch screen
Built-in data logger, memory 5000 measurements for each parameter
12 sockets for input and output modules (not included, refer to options)
7 available glands for inputs / outputs
RS232 included (Sub-D 9 ways female connector) with 2 meters cable for PC
RS485 included for communication with RS485 probes
USB port integrated for USB key connection
Automatic cleaning system with 2-litres tank
Power supply 90-260 VAC 47-63 Hz with power cord 2 meters
Enclosure IP54/Nema3 390x547x282mm (WxHxD) / 20 to 30 kg
Mounting lugs for wall

Sampling pump

P — ***Sampling peristaltic pump for unpressurized water***
Built-in on the left side of the enclosure
Flow of about 0.6 litre/min
Discontinuous operating to increase tube lifetime

P-EXT — ***External Peristaltic sampling pump for unpressurized water***
Flow of about 940 ml/min
Heavy duty brushless motor
Discontinuous operating to increase tube lifetime

IP65 enclosure

IP65 — ***Enclosure IP65 Nema4X***
390x547x282mm (WxHxD)
Mounting lugs for wall

Measurement module by UV absorption

COD-H — ***Organic matter high range***
UV absorption at 254 nm high range: 0 – 2,000 Abs/m
(equivalent to approx. 20,000 mg/l COD on municipal waste water)

COD-L — ***Organic matter low range***
UV absorption at 254 nm low range: 0 – 200 Abs/m
(equivalent to 100 mg/l COD on river water)

COD-M — ***Organic matter Medium range***
UV absorption at 254 nm medium range: 0 – 600 Abs/m

NO3 — ***Nitrate***
Range: 0 – 100 mg/l NO3 (0 – 25 mg/l N of NO3)
Measurement possible until 250 mg/l NO3 (60 mg/l N-NO3)

Measurement module by visible absorption

CO-H — ***Colour high range***
Range: 0 – 1000 Pt-Co unit

CO-L — ***Colour low range***
Range: 0 – 100 Pt-Co unit

Measurement module by UV fluorescence

PAH — ***Poly-aromatic hydrocarbons***
Range: 0 – 10 ppm phenol
(equivalent to approx. 0 – 100 ppm oil with 10% aromatic ratio)

CHLOA — ***Chlorophyll A***
Range: 0 – 300 ppb

Measurement module by colorimetry

PO4-H — ***Phosphate high range***
High range: 0 – 20 mg/l P (60 mg/l PO4)
Sampling peristaltic pump included

PO4-L — ***Phosphate low range***
Low range: 0 – 2 mg/l P (6 mg/l PO4)
Sampling peristaltic pump included

Measurement module by UV absorption in gas phase

NH4 — ***Ammonia***
Range: 0 – 100 mg/l NH4+ (other ranges on request up to 4000 mg/l NH4+)

H2S — ***Hydrogen sulfide***
Range: 0 – 20 mg/l H2S (other ranges on request up to 100 mg/l H2S)

> UV400 Parts references

Measurement by nephelometry

IRTURB-H — ***Internal turbidity sensor high range***
High range: 0 – 1,000 NTU
Nephelometric method by laser diode at 650 nm (850 nm on request)

IRTURB-M — ***Internal turbidity sensor medium range***
Low range: 0 – 100 NTU
Nephelometric method by laser diode at 650 nm (850 nm on request)

IRTURB-L — ***Internal turbidity sensor low range***
Low range: 0 – 10 NTU
Nephelometric method by laser diode at 650 nm (850 nm on request)

Measurement by electrode *(external)*

MPH — ***pH module***
Range: 0 – 14
ATC input for platinum RTD 100 Ohm or 1000 Ohm

ELPH — ***pH online electrode***
Range: 0 – 14
5 meters of cable (10 meters in option)
Built-in ATC RTD 100 Ohm

MORP — ***ORP module***
Range: -2000 mV – +2000 mV
ATC input for platinum RTD 100 Ohm or 1000 Ohm

ELORP — ***ORP online electrode***
Range: -2000 mV – +2000 mV
5 meters of cable (10 meters in option)
Built-in ATC RTD 100 Ohm

MCOND — ***Conductivity module***
Range: 0 – 100 µS to 0 – 100 mS
ATC input for platinum RTD 100 Ohm or 1000 Ohm

ELCOND — ***Conductivity online electrode***
Range: 0 – 10 mS
Cell constant k=1.0 cm-1 (medium range)
5 meters of cable (10 meters in option)
Built-in ATC RTD 1000 Ohm

ICOND — ***Inductive conductivity online probe***
Range: 0 – 100 mS
3 meters of cable
Built-in temperature compensation at 2.2%/°C
Requires a MI4-20 module instead of MCOND module

Measurement by optical methods *(external)*

DO-F — ***Dissolved oxygen probe by fluorescence***
Range: 0 - 25 mg/l O2
7 meters of cable

EXT-TURB-H — ***Turbidity probes high range***
High range: 0 – 30,000 mg/l TSS
7 meters cable

EXT-TURB-L — ***Turbidity probes low range***
Low range: 0 – 1500 mg/l TSS
7 meters cable

Input modules

MI4-20 — ***4-20 mA input module***
Isolated 4-20 mA input
Impedance: 100 Ohm

MIL — ***Double logical inputs module***
Input no 1 : external pulse command for measurement
Input no 2 : measurements inhibition
Isolated 0 – 48 V DC inputs
Impedance: >10 Kohm

Output modules

MO4-20 — ***4-20 mA output module***
Isolated 4-20 mA output
Active output, Max load 500 Ohm

MRELAY — ***Relay module***
Contact rating: 2A/220V
Maximum 6 relays modules allowed

Communications

WIFI400 — ***Wifi Interface***
Connection to wireless WIFI network
300m nominal range (open space)
Secured data transfer (WEP keys)

ETHER400 — ***Ethernet interface***
Ethernet 10 base-T (IEEE 802.3)

MTI133 — ***Phone modem***
Industrial modem 33,6 Kb/s V34+
DIN rail Mounting
Power supply 12V from the analyser

GSM — ***GSM modem***
Dual band (EGSM 900/1800 MHz)
Integral SIM card reader
R & TTE approved

Recommanded consumables for 2 years :

P-ACI-HD1 : *Head of cleaning pump (x1)*
P-RGT-HD1 : *Head of reagent pump (x1) (only for NH4 or H2S)*
T-PHAR-1 : *Tubing 6.4x9.6 mm (if optional sampling pump) - (x2 to x8 depending on sampling pump use)*

Cleaning solution and reagents (if any) are not provided

The manufacturer reserves the right to modify and/or change any specifications, dimensions, design or drawing at any time without prior notice

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