



## Turbidimetry

### Turbiquant<sup>®</sup>

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# Turbiquant® turbidimetry

## Fast, simple, exact

Measure turbidity with the Turbiquant® instruments from Merck. Here you'll find the right solutions for:

- Drinking water
- Wastewater
- Surface water
- Industrial process water

Our instruments are suited for both investigations in the laboratory as well as on-the-spot analyses. We have developed the various models of the Turbiquant® turbidimeters with a focus on routine measurements.

A feature they all have in common is their ease of use and ready to use, non toxic standards for easy calibration.



*The Turbiquant® handheld instruments:  
Portable, light weight and battery-operated  
for on-spot measurements.*

## The advantages of the Turbiquant® system

- Easy to operate and calibrate
- Reliable and reproducible results
- Measurements according to EN ISO 7027 resp. USEPA 180.1
- GLP functions, data transfer
- Broad range of standards for immediate use
- Comprehensive range of accessories, also for continuous-flow measurements

### Deionized water

0.02 NTU



### Drinking water

0.02 to 0.5 NTU



### Spring water

0.05 to 10 NTU



### Waste water (untreated)

70 to 2,000 NTU



### Sift water (paper industry)

60 to 800 NTU



*Turbidity – an expressive parameter in drinking- and wastewater treatment, the beverages industry, and in the chemical sector. Here a few typical turbidity values.*

# Turbiquant® turbidimetry

## Turbiquant® 1100 IR and 1100 T

These instruments are particularly suited for on-the-spot measurements. A robust carry-case and the waterproof casing offer additional protection.

## Turbiquant® 1500 IR and 1500 T

The instrument automatically selects the correct measuring range. A monitoring feature for the calibration interval makes its operation even easier. The optimal continuous flow cell makes it possible to run pressureless continuous-flow measurements.

## Turbiquant® 3000 IR and 3000 T

With its high-precision operation in the measuring range from 0.0001 to 10,000 NTU, this instrument is suited for the analysis of extra-pure water and quality-assurance operations in the beverages industry all the way to the investigation of wastewaters. Comprehensive AQA functions, the display of results in NTU, EBC, FNU, FAU, and nephelos, and the ratio-measurement option satisfies even the most demanding user. In addition to pressureless continuous-flow measurements it is also capable of working continuously up to a pressure of 4 bar.



## IR or T – where's the difference?

For standard-compliant measurements according to EN ISO 7027 an IR-LED (infrared) light source with a wavelength of 860 nm is prescribed (IR-models).

The USEPA Method 180.1 and also APHA - AWWA - WPCF require the use of a tungsten lamp emitting white light (T-models).

IR measurements show no interference when colored solutions are used. Tungsten lamps are more sensitive in cases in which the most minute particles are to be measured.

## Turbiquant® system at a glance

### Turbiquant® 1100 – for on-the-spot measurements

Instrument	Light source	Measuring range	Applications	Special features
Turbiquant® 1100 IR	IR LED	0.01 – 1,100 NTU/FNU	Portable instrument for on-the-spot analysis	Portable, battery-operated instrument
Turbiquant® 1100 T	Tungsten lamp	0,01 – 1,100 NTU/FNU	Portable instrument for on-the-spot analysis	Portable, battery-operated instrument



### Turbiquant® 1500 – instrument for routine measurements in the laboratory

Instrument	Light source	Measuring range	Applications	Special features
Turbiquant® 1500 IR	IR LED	0 – 1,000 NTU/FNU	Standard instrument for all applications in the laboratory suitable for drinking water	Continuous-flow measurements (pressureless), AQA functions
Turbiquant® 1500 T	Tungsten lamp	0 – 1,000 NTU/FNU	Standard instrument for all applications in the laboratory suitable for drinking water	Continuous-flow measurements (pressureless), AQA functions



### Turbiquant® 3000 – the precision instrument for turbidimetry

Instrument	Light source	Measuring range	Applications	Special features
Turbiquant® 3000 IR	IR LED	0 – 10,000 NTU/FNU/FAU, 0 – 2,450 EBC	Precision instrument also for demanding turbidimetric applications	Continuous-flow measurements (pressureless or up to 4 bar), AQA functions, password protection, ratio measurements, transmission (IR only)
Turbiquant® 3000 T	Tungsten lamp	0-10,000 NTU, 0-2,450 EBC, 0-67,000 NEPHELO	Precision instrument also for demanding turbidimetric applications	Continuous-flow measurements (pressureless or up to 4 bar), AQA functions, password protection, ratio measurements



The measurement method of the Turbiquant® 1100/1500/3000 IR instruments conforms with EN ISO 7027, that in the Turbiquant® 1100/1500/3000 instruments is analogous to the guidelines of the USEPA.

# Turbiquant® instruments

## Turbidimetry with Turbiquant®

The Turbiquant® 1100 IR and 1100 T instruments are portable, battery-operated turbidimeters. The four standard batteries provide power for more than 5,000 measurements. The easy operation, the practical carrying case, and the waterproof casing that ensures that the electronic components are adequately protected make the Turbiquant® 1100 IR and 1100 T the ideal instruments for on-the-spot analysis.

Ord. No. 1.18324.0001



### Turbiquant® Turbidimeter 1100 IR

Portable, battery-operated instrument for on-the-spot analysis

Scope of delivery	2 empty cells, manual, handy hints, carrying case, 4 batteries
Measuring principle	nephelometric – 90° scattered light, conform with EN ISO 7027
Light source	IR LED
Indication of units	NTU / FNU
Measuring range	0.01 - 1,100 NTU
Resolution	0.01 within the range 0.01 < x < 99.99 NTU 0.1 within the range 100.0 < x < 999.9 NTU 1 within the range 1,000 < x < 1,100 NTU
Accuracy	±2 % of reading or ±0.1 NTU for range 0 - 500 NTU ±3 % of reading for range 500 - 1,100 NTU
Calibration	automatic 3 points or partial (user-defined)
Response time	14 seconds
Cuvettes	25 x 45 mm
Sample volume	15 ml
Protection type	designed to meet IP 67
Power requirements	4 alkali manganese batteries, AAA / Micro
Test certificates	CE
Warranty	2 years

Also required: Turbiquant® Calibration Standard Set

Ord. No. 1.18335.0001

Ord. No. 1.18325.0001



### Turbiquant® Turbidimeter 1100 T

Portable, battery-operated instrument for on-the-spot analysis

Scope of delivery	2 empty cells, manual, handy hints, carrying case, 4 batteries
Specifications	same as Turbiquant® 1100 IR, but tungsten lamp
Measurement principle	nephelometric – 90° scattered light, follows USEPA recommendations
Light source	white light tungsten lamp
Measurement units	NTU / FNU
Warranty	2 years

Also required: Turbiquant® Calibration Standard Set

Ord. No. 1.18335.0001



*IQ and OQ documents for all Turbiquant® Instruments further details see page 148.*

**Turbiquant® 1500 IR and 1500 T** These instruments have large and easy-to-read displays and can be simply operated with just a few buttons. It goes without saying that the user is guided through the operation procedure via the display. A continuous-flow cell enables a high sample throughput to be achieved.

**Turbiquant® Turbidimeter 1500 IR**

Ord. No. 1.18330.0001

For routine measurements in the laboratory

Scope of delivery	universal power supply / plug 3 empty cells, manual, handy hints
Measurement modes	nephelometric (non ratio), conform with EN ISO 7027
Light source	IR LED
Indication of units	NTU (= FTU = FNU)
Measuring range	0 - 1,000 NTU
Resolution	max. 0.01 within the range $0 < x < 10$ NTU max. 0.1 within the range $10 < x < 100$ NTU max. 1 within the range $100 < x < 1,000$ NTU
Accuracy	$\pm 2$ % of reading or $\pm 0.01$ NTU for range 0.00 - 1,000 NTU
Reproducibility	$< \pm 1$ % of reading or $\pm 0.01$ NTU
Calibration	automatic 1 to 3 points
Response time	$< 3$ seconds
Cuvettes	28 x 70 mm
Sample volume	25 ml
Serial input / output	RS 232, uni-directional
Real time clock	integrated
Other functions	GLP function (calibration intervals monitoring), automatic self check, integrated real time clock
Power requirements	universal power supply / plug
Test certificates	CE, CETPlus
Warranty	2 years



**Also required: Turbiquant® Calibration Standard Set**

Ord. No. 1.18328.0001

**Turbiquant® Turbidimeter 1500 T**

Ord. No. 1.18331.0001

For routine measurements in the laboratory

Scope of delivery	universal power supply / plug 3 empty cells, manual, handy hints
Specifications	same as Turbiquant® 1500 IR, but tungsten lamp
Measurement principle	nephelometric (non-ratio), follows USEPA recommendations
Light source	tungsten lamp
Warranty	2 years



**Also required: Turbiquant® Calibration Standard Set**

Ord. No. 1.18328.0001

# Turbiquant® instruments

**Turbiquant® 3000 IR oder 3000 T** In addition to the specifications of the Turbiquant® 1500 IR and 1500 T the user can select different measurement methods and result terms. The Turbiquant® 3000 IR, for example can display the following units:

- NTU – nephelometric turbidity units (90° diffused-light measurement)
- EBC – guidelines of the European Brewery Convention
- FNU – formazine nephelometric units (calibration with formazine)
- FAU – formazine attenuation units (DIN measurement beyond 40 FNU)

The methods available are those of nephelometry, densitometry and ratio measurement. It is also possible to make continuous-flow measurements with a low-pressure continuous-flow cell using a purging gas.

Ord. No. 1.18332.0001

**Turbiquant® Turbidimeter 3000 IR**



The precision instrument

Scope of delivery	universal power supply / plug, 3 empty cells, manual, handy hints		
Measurement modes	nephelometric (non-ratio / ratio selectable), conform with EN ISO 7027		
Light source	IR LED		
Indication of units	NTU, FNU, FAU, EBC		
Measuring range	0 - 10,000 NTU, 0 - 10,000 FNU, 0 - 10,000 FAU, 0 - 2,450 EBC		
Resolution	selectable 0.1- 0.0001 NTU max. 0.0001 max. 0.001 max. 0.01 max. 0.1	within the range within the range within the range within the range	0 < x < 10 NTU 10 < x < 100 NTU 100 < x < 1,000 NTU 1,000 < x < 10,000 NTU
Accuracy	±2 % of reading or ±0.01 NTU for range 0.00 - 1,000 NTU ±5 % of reading for range 1,000 - 4,000 NTU ±10 % of reading for range 4,000 - 10,000 NTU		
Repeatability	< ±1 % of reading or ±0.01 NTU		
Calibration	automatic 1 to 4 points (to 1,750 NTU) 10,000 NTU selectable		
Response time	< 6 s		
Cuvettes	28 x 70 mm		
Sample volume	25 ml		
Serial input / output	RS 232, bi-directional		
Real time clock	integrated		
Other functions	GLP function (calibration interval monitoring), automatic self check, integrated real time clock, safety access codes for calibration and instrument setup		
Power requirements	universal power supply / plug		
Test certificates	CE, CETPlus		
Warranty	2 years		

**Also required: Turbiquant® Calibration Standard Set**

**Ord. No. 1.18329.0001**



**Turbiquant® Turbidimeter 3000 T** **Ord. No. 1.18333.0001**

The precision instrument	
Scope of delivery	universal power supply / plug 3 empty cells, manual, handy hints
Specification	same as Turbiquant® 3000 IR, but tungsten halogen lamp
Measuring mode	nephelometric (non-ratio/ratio selectable), follows USEPA recommendations
Light source	tungsten lamp
Indication of units	NTU, EBC, nephelos
Measuring range	0 - 10,000 NTU, 0 - 2,450 EBC, 0 - 67,000 nephelos
Warranty	2 years



**Also required: Turbiquant® Calibration Standard Set** **Ord. No. 1.18349.0001**

## Turbiquant® accessoires

**Empty cells** **Ord. No.**

Turbiquant® 1000/1100 cells (1 pack = 3 pcs)	1.18320.0001
Turbiquant® 1500/3000 cells (1 pack = 3 pcs)	1.18336.0001

**Lamps** **Ord. No.**

Turbiquant® 1500 IR lamp module	1.18344.0001
Turbiquant® 3000 IR lamp module	1.18382.0001
Turbiquant® 1500/3000 tungsten lamp module	1.18338.0001

**Other accessories and cables** **Ord. No.**

Turbiquant® 1500/3000 cell rack	1.18339.0001
Turbiquant® 1500/3000 continuous-flow cell	1.18340.0001
Turbiquant® 3000 continuous-flow cell (low-pressure)	1.18341.0001
Printer cabel for Turbiquant® 1500/3000 (for serial interface)	1.09759.0001
PC cable for Turbiquant® 1500/3000 (for serial interface)	1.14667.0001

# Turbiquant<sup>®</sup> instruments

## Primary calibration standards

AMCO-AEPA-1<sup>®</sup> Microspheres are primary calibration standards that conform with USEPA Method 180.1. (see also Standard Methods for Examination of Water and Wastewater 21st Edition (2005), Section 2130, Turbidity).

In compliance with EN ISO standard 7027: 1999 Water Quality – Turbidimetry – these standards count as alternative secondary standards to freshly prepared formazine suspensions.

## The advantages of the Turbiquant<sup>®</sup> calibration standards

1. Cited as primary calibration standards in compliance with USEPA method 180.1.
2. Accepted as alternative use secondary standards according EN ISO 7027:1999.
3. More stable than formazin with a minimum shelf life of 12 months.
4. Non toxic.
5. Can be stored and transported without any precautionary measures.
6. Supplied ready-to-use.
7. Coming with indexing ring for quick and repeatable indexing as recommended by US EPA.
8. Incomparable precision:

10 NTU	±1 %
100 NTU	±1 %
1,000 NTU	±1 %
1,750 NTU	±2 %
10,000 NTU	±2 %

## Turbiquant® Calibration Standard Sets

Turbiquant® 1000 Calibration Standard	Ord. No.
Turbiquant® 1000 IR Calibration Standard Set 4 standards 0.02 - 10.0 - 100.0 - 1,000 NTU	1.18327.0001
Turbiquant® 1100 Calibration Standard	Ord. No.
Turbiquant® 1100 IR / 1100 T Calibration Standard Set 3 standards 0.02 - 10.0 - 1,000 NTU	1.18335.0001
Turbiquant® 1500 Calibration Standard	Ord. No.
Turbiquant® 1500 IR / 1500 T Calibration Standard Set 3 standards 0.02 - 10.0 - 1,000 NTU	1.18328.0001
Turbiquant® 3000 Calibration Standard	Ord. No.
Turbiquant® 3000 IR Calibration Standard Set 4 standards 0.02 - 10.0 - 100.0 - 1,750 NTU	1.18329.0001
Turbiquant® 3000 T Calibration Standard Set 4 standards 0.02 - 10.0 - 100.0 - 1,750 NTU	1.18349.0001
Turbiquant® 3000 IR Calibration Standard 10,000 NTU	1.18342.0001
Turbiquant® 3000 T Calibration Standard 10,000 NTU	1.18343.0001
Turbiquant® 1500 / 3000 Calibration Standard 10 NTU	1.18381.0001

### Turbiquant®

Don't forget to add the Turbiquant® Calibration Standard Set to your order of the instrument!

