

xylem



# Titration

TITRATORS, AUTOSAMPLERS, SOFTWARE AND ELECTRODES

CATALOG  
XA00010



a xylem brand



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# 1. The world of titration

TitroLine and TITRONIC titrators provide a customizable experience to ensure efficient and accurate results for any application. As your demands grow our titrators are built to handle upgrades and additions that can grow with you.

- ▶ High visibility, full color display that can be easily viewed from a distance and at extreme angles.
- ▶ Reagent data is securely stored in the intelligent and interchangeable modules (not: TITRONIC® 300 and TitroLine® 5000).
- ▶ Automatic wireless recognition of SI Analytics ID electrodes and IDS interface (TitroLine® 7800) guarantee accurate calibration and measurements.
- ▶ Includes up to three USB, one LAN, and two RS232 ports for expansion and connection of devices such as USB storage of methods and data, stirrer, laboratory balance, PC and more peripheral devices.
- ▶ Export the results as PDF or CSV, as well as to networks.
- ▶ Transfer of methods via USB device.

Advantages  
TitroLine® /TITRONIC®

TITRONIC® 500  
TitroLine® 7000 / 7750 / 7800



Titration/Burettes



TitroLine® 5000  
TITRONIC®300

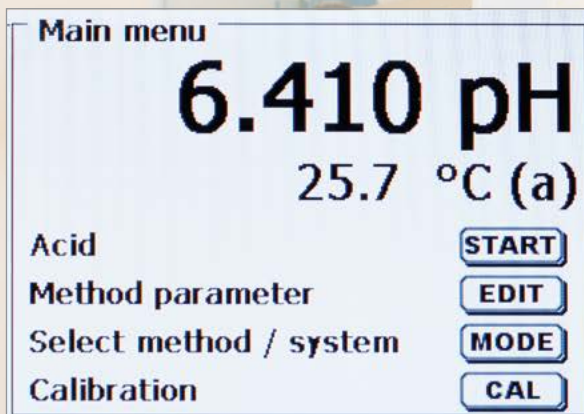
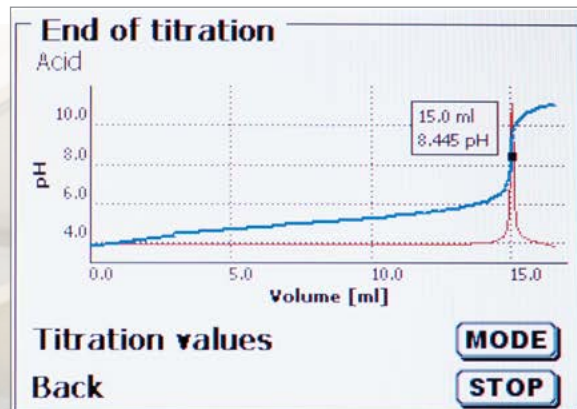


TitroLine® 7500 KF  
TitroLine® 7500 KF trace

# Innovative features

## High Visibility Graphic Display

- ▶ Exceptional high visibility graphic display for viewing even at extreme angles.
- ▶ Clear graphic representation of titration curves and the first derivative curve (TitroLine®).
- ▶ Equivalence point values are displayed in the titration curve (TitroLine®).



**Intelligent, Interchangeable Modules**  
(Except: T300/TL5000/TL7500 KF trace)

- ▶ Size options of 5, 10, 20 and 50 ml.
- ▶ Compact, space saving footprint.
- ▶ All relevant reagent and unit data are stored in the integrated RFID-chip including:
  - Burette size (ml)
  - Titrant name
  - Titrant concentration or titer value of solution
  - Date of manufacture or expiration date of the reagent



**Flexible Configuration Features**

Expand and customize your workstation using up to three USB, one LAN, and two RS232 ports for a total of five connection options for:

- Magnetic stirrer TM 235 and USB mouse
- USB printer (Standard A4 HP-PCL) and compact printer TZ3863
- USB keyboard
- Network
- Barcode reader
- USB storage device and hub
- Balance and PC
- Other YSI devices

USB printer A4 format



Thermo printer DPU S445



Keyboard



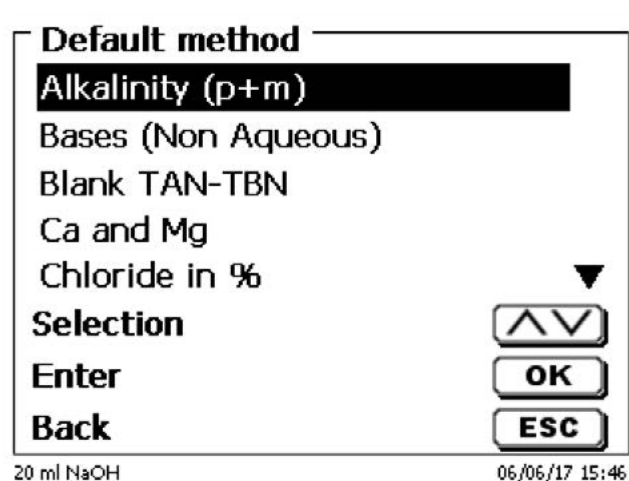
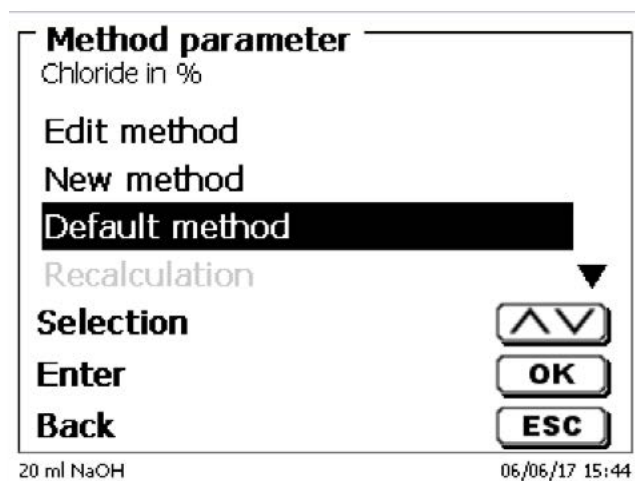
USB manual controller



# Innovative features

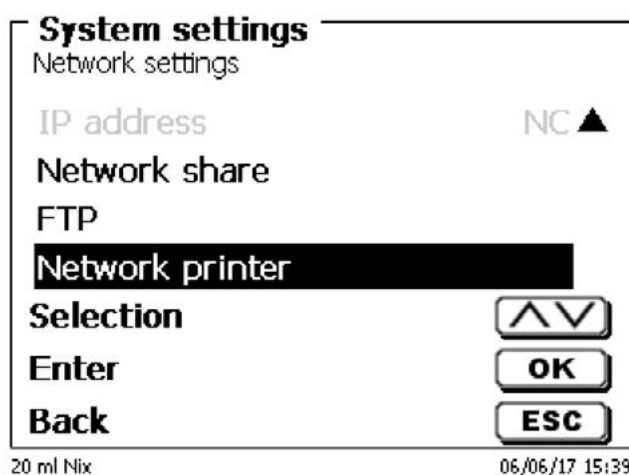
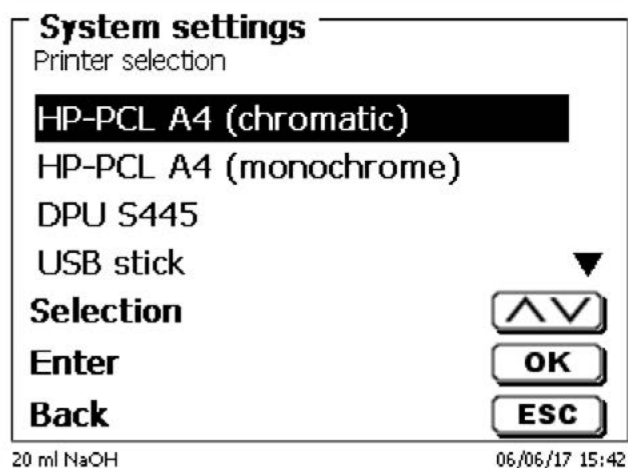
Standard Methods:

- Each piston burette or titrator has already pre-installed standard methods.
- The standard methods are loaded and can be used, but also modified.
- The pre-installed standard method will always stay retained and can be re-installed at any time.



Documentation:

- The results are documented on a USB device in PDF and CSV formats.
- The results can also be printed on a DIN A 4 (color or b / w) or on a thermal printer.
- The printer can be connected directly to the titrator / piston burette, or it can be printed via a network printer.
- When connected to a network, the PDF and CSV files can be stored in a shared directory.



### Formula Editor

- ▶ The formula editor allows the use of individual calculations.
- ▶ Select one of the standard formulas and modify them if necessary.
- ▶ In addition to a number of units (% , g, l) you can also assign an individual unit.
- ▶ Results (titre, blank value, etc.) can be automatically written to global memory and reused later.

**Result**  
Chloride in %  
Result text  
Edit formula  
Select formula  
Formula parameter  
Selection  
Enter  
Back  
20 ml NaOH

**Edit formula 1**  
Chloride in %  
$$(EQ1-B) * T * M * F1 / (W * F2)$$
  
Back  
20 ml NaOH

**Edit name**  
M01:Blank value  
  
Blank value  
  
Position <>  
Continue OK  
Back ESC  
20 ml NaOH 06/06/17 15:53

# 1.1 TITRONIC® and TitroLine® at a glance

Application	TITRONIC® 300	TITRONIC® 500	TitroLine® 5000
Intelligent interchangeable units (5, 10, 20 and 50 ml)	*	■	*
Manual titration	■	■	■
Dosing	■	■	■
Solutions preparation (Manually or automatically with connected balance)	—	■	—
Automatic titration (Independent with external software)	**	**	■
Applications with TitrISOft	■	■	—
pH-stat-applications (Enzyme kinetics, soil samples, biotechnology)	—	—	—
Applications with sample changer	—	—	—
pH/mV titrations "aqueous" (Alkalinity, hydrochloric acid, citric acid, Kjeldahl...)	—	—	■
pH/mV titrations "non aqueous" (TAN/TBN, FFA, titrations with perchloric acid...)	—	—	—
Redox titrations (Iodometry, permanganometry...)	—	—	■
Redox titrations (COD)	—	—	■
Halide titrations (Chloride, "salt"...)	—	—	■
Hydrogen sulphide and mercaptans	—	—	—
Sulfurous acid in wine and beverages	—	—	—
Bromine number	—	—	—
Water analysis according to KF Volumetric method (10 ppm - 100%)	—	—	—
Water analysis according to KF Coulometric method (1 ppm - 5%)	—	—	—
Measuring two parameters at the same time (e.g. pH and Cond)	—	—	—
Photometric titration (OptiLine 6)	—	—	—

\* 20 and 50 ml dosing unit usable (no intelligent interchangeable units)

\*\* Can be used as titration and dosing burette in automatic titration systems

TitroLine® 7000	TitroLine® 7500 KF	TitroLine® 7500 KF trace	TitroLine® 7750	TitroLine®7800
■	■	—	■	■
■	—	—	■	■
■	■	—	■	■
■	■	—	■	■
■	■	■	■	■
■	■	■	■	■
■	—	—	■	■
■	—	—	■	■
■	—	—	■	■
■	—	—	■	■
■	—	—	■	■
■	—	—	■	■
■	—	—	■	■
■	—	—	■	■
■	—	—	■	■
■	■	—	■	■
■	■	■	■	■
—	■	—	■	■
—	—	■	—	—
—	—	—	—	■
■	—	—	■	■

Titration/Burettes

## 2. Applications overview

### Water and Wastewater Analysis



Application	TitroLine® 5000	TitroLine® 7000 / 7750	TitroLine® 7800
Alkalinity (p+m-value)	■	■	■
COD	■	■	■
Permanganate index	■	■	■
FOS/TAC	■	■	■
pH + Cond + acid capacity	■	■	■
Kjeldahl-nitrogen/ammonia (After distillation)	■	■	■
Chloride in drinking and wastewater	■	■	■
Chlorine in drinking water	■	■	■
Calcium and magnesium hardness (2 equivalence points)	■	■	■
Total hardness (Sum Ca/Mg; 1 equivalence point)	■	■	■

### Food and Beverage



Application	TitroLine® 5000	TitroLine® 7000 / 7750	TitroLine® 7800
Total acidity in wine and soft drinks	■	■	■
Total acidity in food (ketchup, salad dressing)	■	■	■
Ash alkalinity	■	■	■
Chloride ("salt") in food and mineral water	■	■	■
Sulfurous acid (SO <sub>2</sub> ), free and total	■	■	■
Volatile acids	■	■	■
Titrateable acidity in milk (Soxlet Henkel (SH) index)	■	■	■
Reducing sugars	■	■	■
Ascorbic acid (vitamin C)	■	■	■
Calcium in milk and dairy products	■	■	■
Calcium and magnesium in mineral water	■	■	■
Formol index	■	■	■
Nitrite in pickling salt	■	■	■
Iodine number	■	■	■
Peroxide number	■	■	■
Saponification number	■	■	■
Acidity (FFA) in fats and oils	■	■	■

# Industrial Products



Application	TitroLine® 5000	TitroLine® 7000 / 7750	TitroLine® 7800
	■	■	■
	■	■	■
	■	■	■
	■	■	■
	■	■	■
	■	■	■
	■	■	■
	■	■	■
	■	■	■

Titrators/Burettes

- Excellent application suitability
- Titration is possible for this application with restrictions and must be evaluated
- Not applicable



# 3.1 TITRONIC® 300 - Elevating the manual titration

The TITRONIC® 300 is a perfect motor-driven burette for manual titration and a precise dosing instrument for dispensable liquids, solvents and titrating agents.

The TITRONIC® 300 is not only a stand-alone device, but also shows its strengths in the computer-controlled "Daisy Chain" network. Up to 16 devices can be connected.

## Manual Titration

Manual titration remains one of the standard, cost-effective applications in the lab, where high precision and flexibility are required.

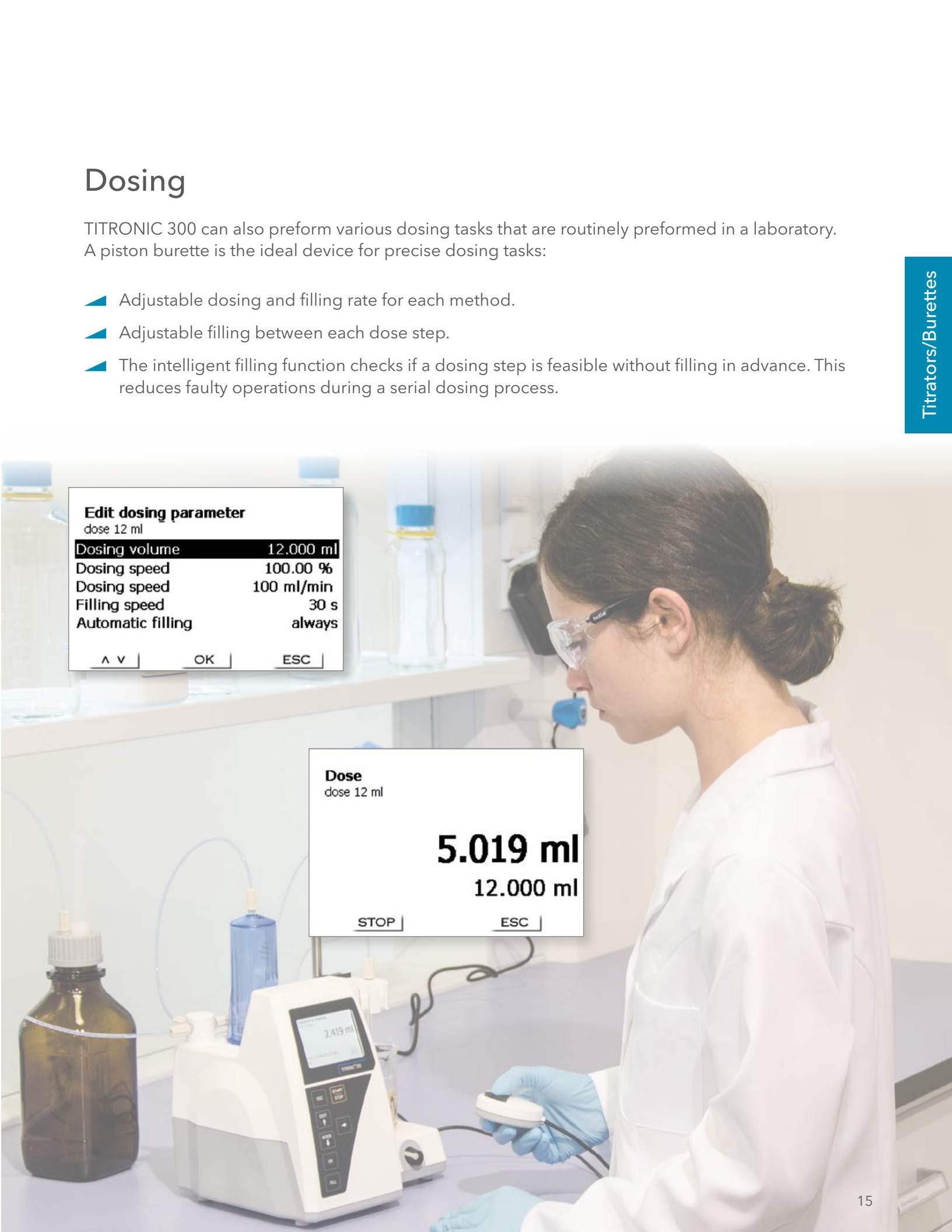
- ▶ Titration with hand controller.
- ▶ Titration rate can be adjusted in five different steps to optimize the titration speed and accuracy.
- ▶ Automatic calculation of results in different units and exportation to a printer or USB memory device.
- ▶ Automatic weight recording when a balance is connected.



# Dosing

TITRONIC 300 can also perform various dosing tasks that are routinely performed in a laboratory. A piston burette is the ideal device for precise dosing tasks:

- ▶ Adjustable dosing and filling rate for each method.
- ▶ Adjustable filling between each dose step.
- ▶ The intelligent filling function checks if a dosing step is feasible without filling in advance. This reduces faulty operations during a serial dosing process.



Edit dosing parameter	
dose 12 ml	
Dosing volume	12.000 ml
Dosing speed	100.00 %
Dosing speed	100 ml/min
Filling speed	30 s
Automatic filling	always
▲ V   OK   ESC	

Dose	
dose 12 ml	
5.019 ml	
12.000 ml	
STOP   ESC	

## 3.2 TitroLine® 5000 - Effortless titration

The predecessor of the TitroLine® 5000, TitroLine® Easy, has always been the first choice for an easy-to-use automatic titrator for any application. Prior in-depth knowledge about automatic titration is not necessary to get quick and precise results. The new TitroLine® 5000 addresses the need for a user friendly automatic titration system and more:

- ▶ High resolution pH/mV-measurement input for pH-, ORP-, silver - and further mV-electrodes
- ▶ Pt 1000 and NTC 30 temperature measurement input for automatic temperature compensation
- ▶ Pre-installed standard methods for FOS/TAC, alkalinity, total acidity in drinks, chloride etc.
- ▶ Linear and dynamic titration to equivalence points
- ▶ Titration to pH and mV-end points
- ▶ Same manual titration and dosing function as the piston burette TITRONIC® 300





## 3.3 Specifications - TITRONIC® 300

Features	
Interfaces:	1 x USB-A and 1 x USB-B, 2 x RS-232-C
Stirrer connection:	TM 50, power supply directly through piston burette
Keyboard:	The unit is operated using the keys on the device itself, the controller TZ 3880, and optional PC-keyboard (USB)
Display:	Graphics-capable TFT display.
Volume display:	0000.000...9999.999 ml
Display resolution:	0.005-0.025 ml (depending on dosing unit)
Dosing speed:	Max. 100 ml/min (with 50 ml unit)
Filling speed:	Min 30 s to 999 s adjustable (time according to the cylinder volume)
Dosing units:	20 ml or 50 ml dosing unit, interchangeable
Burette resolution:	8000
Dosing accuracy:	Systematic error 0.15 %, random error 0.05 % in compliance with EN ISO 8655-6
Power supply:	100 -240 V~; 50/60 Hz, power input 30 VA
Conformity:	ISO 8655, part 6
CE-mark:	EMC: 2004/108/EG; safety EG- Directive 2006/95
Dimensions	135 x 310 x 205 mm (W x H x D), including dosing unit, without stirrer
Weight:	2 kg (without stirrer)
Ambient conditions:	Ambient temperature: + 10 ... + 40 °C for operation and storage. Humidity according to EN 61 010, Part 1:Max. relative humidity 80 % for temperatures up to 31 °C, linear decrease down to 50 % relative humidity at a temperature of 40 °C

## Ordering information - TITRONIC® 300

Type No.	Order No.	Description
T 300/20 M1	285230020	<b>TITRONIC® 300 without magnetic stirrer</b> TITRONIC® 300 basic unit with ready-to-use assembled 20 ml dosing unit, manual controller, titration clamp, stand rod and power supply 100-240 V
T 300/50 M1	285230060	<b>TITRONIC® 300 without magnetic stirrer</b> TITRONIC® 300 basic unit with ready-to-use assembled 50 ml dosing unit, manual controller TZ 3880, titration clamp, stand rod and power supply 100-240 V
T 300/20 M2	285230030	<b>TITRONIC® 300 with magnetic stirrer</b> TITRONIC® 300 basic unit with ready-to-use assembled 20 ml dosing unit, magnetic stirrer TM 50, manual controller, titration clamp, stand rod and power supply 100-240 V
T 300/50 M2	285230070	<b>TITRONIC® 300 with magnetic stirrer</b> TITRONIC® 300 basic unit with ready-to-use assembled 50 ml dosing unit, magnetic stirrer TM 50, manual controller, titration clamp, stand rod and power supply 100-240 V

## Accessories - TITRONIC® 300

Type No.	Order No.	Description
TM 50	285225840	<b>Magnetic stirrer</b>
TZ 3835	285220410	<b>USB-keyboard</b>
TZ 3830	285220420	<b>USB-HUB</b>
TZ 3803	285220590	<b>Reagent bottle, amber, 1l</b>

# Specifications - TitroLine® 5000

Features	
Measurement input pH/mV:	pH/mV-input with Electrode socket according to DIN 19 262 or additional with BNC socket insert (Z 860)
Measurement input temperature:	Pt 1000/NTC 30: (socket 2 x 4 mm)
Interfaces:	1 x USB-A and 1 x USB-B, 2 x RS-232-C
Stirrer connection:	TM 50 power supply directly through piston burette
Keyboard:	The unit is operated using the keys on the device itself, the controller TZ 3880 and optional PC-keyboard (USB)
Display:	Graphics-capable TFT display
Volume display:	0000,000...9999,999 ml
Display resolution:	0.005-0.025 ml (depending on dosing unit)
Dosing speed:	Max. 100 ml/min (with 50 ml unit)
Filling speed:	Min 30 s to 999 s adjustable (time according to the cylinder volume)
Dosing units:	20 ml or 50 ml dosing unit, interchangeable
Burette resolution:	8000
Dosing accuracy:	Systematic error 0.15 %, random error 0.05 % in compliance with EN ISO 8655-6
Power supply:	100 -240 V~; 50/60 Hz, power input 30 VA
Conformity:	ISO 8655, part 6
CE-mark:	EMC: 2004/108/EG; safety EG- Directive 2006/95
Dimensions:	135 x 310 x 205 mm (W x H x D), including dosing unit, without stirrer
Weight:	2.3 kg (without stirrer)
Ambient conditions:	Ambient temperature: + 10 ... + 40 °C for operation and storage. Humidity according to EN 61 010, Part 1: Max. relative humidity 80 % for temperatures up to 31 °C, linear decrease down to 50 % relative humidity at a temperature of 40 °C

## Ordering information - TitroLine® 5000

Type No.	Order No.	Description
TL 5000/20 M1	285230100	<b>TitroLine® 5000 with 20 ml dosing unit</b> Basic unit without electrode, with ready-to-use assembled 20 ml dosing unit, manual controller, titration clamp, stand rod, magnetic stirrer TM 50 and power supply 100-240 V
TL 5000/50 M1	285230150	<b>TitroLine® 5000 with 50 ml dosing unit</b> Basic unit without electrode, with ready-to-use assembled 50 ml dosing unit, manual controller, titration clamp, stand rod, magnetic stirrer TM 50 and power supply 100-240 V
TL 5000/20 M2	285230110	<b>TitroLine® 5000 with 20 ml dosing unit</b> Basic unit with pH electrode and buffer set, with ready-to-use assembled 20 ml dosing unit, manual controller, titration clamp, stand rod, magnetic stirrer TM 50 and power supply 100-240 V
TL 5000/50 M2	285230160	<b>TitroLine® 5000 with 50 ml dosing unit</b> Basic unit with pH-electrode and buffer set, with ready-to-use assembled 50 ml dosing unit, manual controller, titration clamp, stand rod, magnetic stirrer TM 50 and power supply 100-240 V
TL 5000/20 M3	285230120	<b>TitroLine® 5000 with 20 ml dosing unit</b> Basic unit with Ag-electrode, with ready-to-use assembled 20 ml dosing unit, manual controller, titration clamp, stand rod, magnetic stirrer TM 50 and power supply 100-240 V

## Accessories - TitroLine® 5000

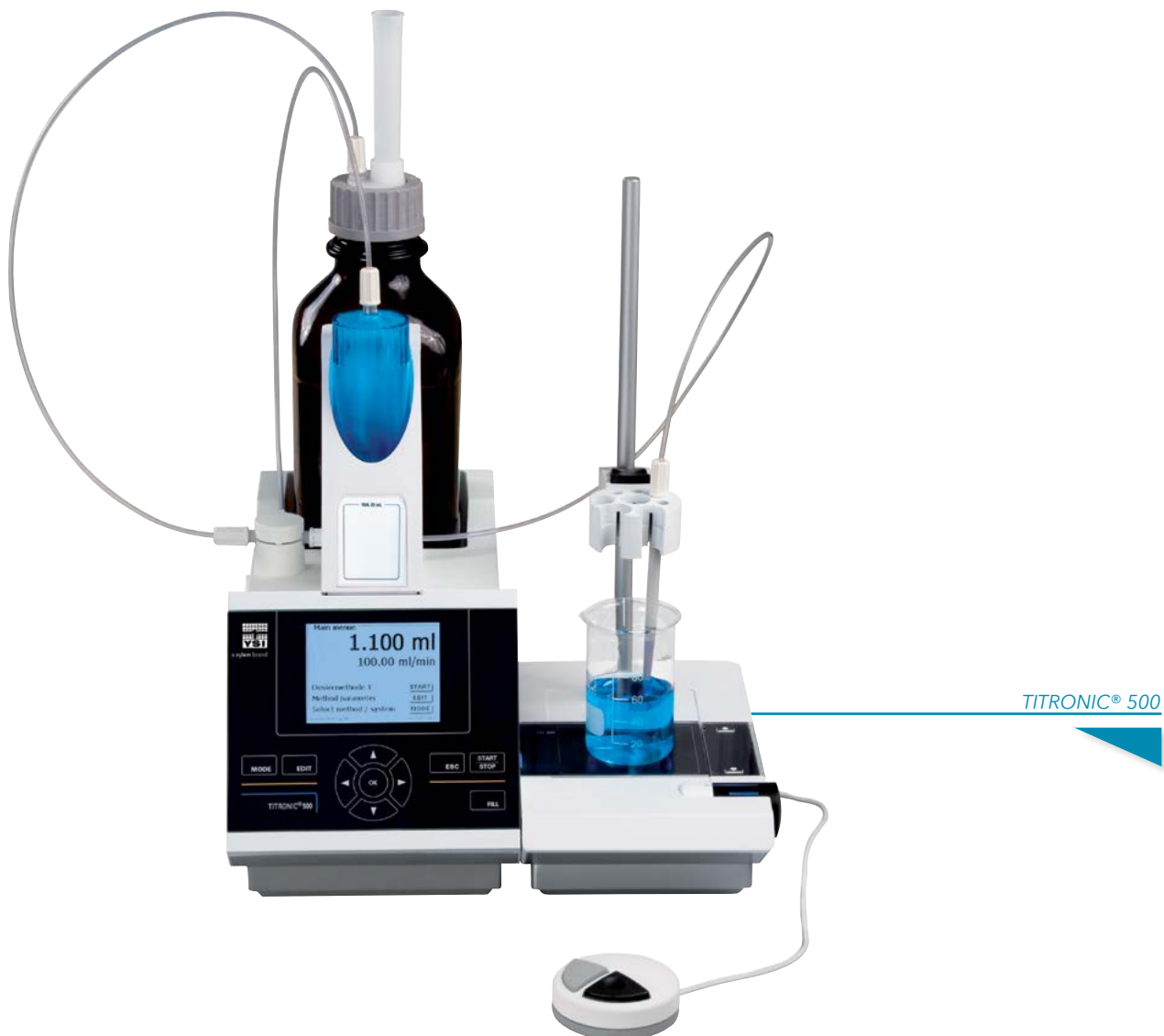
Type No.	Order No.	Description
TZ 3835	285220410	<b>USB-keyboard</b>
TZ 3830	285220420	<b>USB-HUB</b>
TZ 3803	285220590	<b>Reagent bottle, amber, 1l</b>

# 4.1 TITRONIC® 500: The Class A upgrade

The TITRONIC® 500 is the ideal piston burette for manual titrations, accurate dosing applications, as well as the preparation of solutions. When used with TitrSoft 3.3, it acts as a titration burette. With the Titroline7000 and TitrSoft 3.3, it becomes an automatic dosing unit, perfect to pre dose a titrant.

## Important features:

- ▶ Intelligent interchangeable modules with 5, 10, 20 and 50 ml volume capacity.
- ▶ Connect to a printer and/or an analytical balance.
- ▶ Remote control access via RS232 or USB interface.
- ▶ Connect up to 16 devices using one USB or RS232 port of a PC with the two integrated RS232 interfaces (Daisy Chain).



## Manual titration

It is true that the automatic titration is gaining ground, but manual titration remains one of the standard cost effective applications in the lab. TITRONIC® 500 is the elevated motor piston burette option with available interchangeable dosing modules created with an intelligent design.

### Important features:

- Titration using the manual controller dosing buttons.
- Titration rate can be adjusted to optimize titration speed and accuracy.
- Programmable automatic calculations, printer ready.
- Automatic weight recording when balance is connected.

## Dosing

There are multiple routine dosing tasks that must be performed in the lab in addition to titration. The TITRONIC® 500 can alleviate those tasks.

### Important features:

- Control dosing using the manual controller and the dedicated keypad
- Adjustable dosing and filling rates optimize speed and accuracy
- Store dosing methods with different parameters

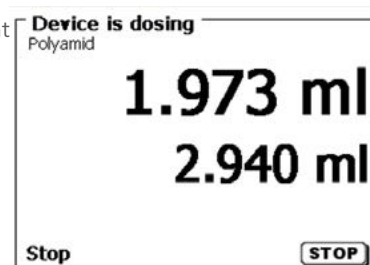


## Solutions preparation

A special sample preparation mode is available on the TITRONIC® 500 where a reagent is dosed into a sample until the required concentration is reached. The sample is weighed and the dosing volume is determined. The volume can then be automatically added to the sample. This mode is used for tasks like preparing standard and sample solutions for viscometry.

### Important features:

- Adjustable dosing and filling speed
- Dosing volume is automatically calculated without additional PC software
- Several methods with different parameters can be stored
- Automatic weight recording when balance is connected



## 4.2 TitroLine® 7000: The professional step

With its performance spectrum, the TitroLine® 7000 is the ideal starting device for potentiometric titration with potential for expansion and automation. It is possible to determine a wide range of parameters quickly and accurately due to the high-resolution measuring interface providing precise pH/mV and „dead-stop“ results.

### More methods

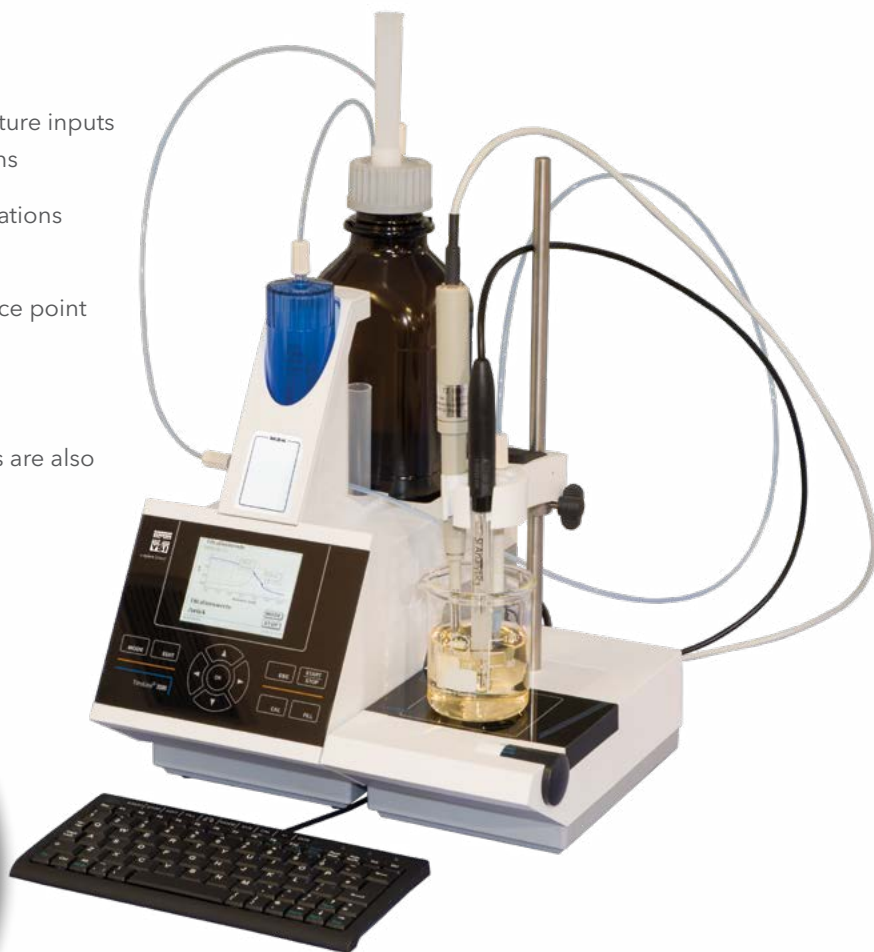
As a rule, 10-15 user methods are usually enough for most requirements, but sometimes you need a little more capacity. The TitroLine® 7000 offers storages up to 50 user methods.

### Measurement and calibration with the highest accuracy

The wireless sensor recognition automatically recognizes SI Analytics® ID electrodes and instantly stores dedicated sensor data, eliminating measurement and calibration errors.

### Features of the TitroLine® 7000 include:

- High resolution pH/mV-electrode and temperature inputs for pH, ISE, redox (ORP) or photometric titrations
- Polarizable electrode input for set endpoint titrations ("Dead-stop")
- Linear (fixed increment) and dynamic equivalence point titration mode
- Titrationen to pH/ mV and  $\mu\text{A}$ -endpoint
- Manual titration mode and routine dosing tasks are also available



*pH/mV interface  
for ID electrodes*

▲ Typical applications of the water/wastewater and environmental analysis:

- pH-value, alkalinity ("p+m-value")
- Permanganate index
- COD
- Volatile fatty acids/Total anorganic carbon (FOS/TAC)
- Total nitrogen according to Kjeldahl
- Chloride in waste and drinking water
- Free and total chlorine in drinking and bathing water
- Ca/Mg-and total hardness
- Oxygen according to "Winkler" method



Titration application  
"chemical oxygen demand" COD

Application example for food analysis: "Determination of free and total sulfurous acid ( $\text{SO}_2$ ) in wine."

Since ancient times, the wine is being preserved through the addition of "sulfur" (sulfurous acid).

The addition of sulfurous acid inhibits the oxidation processes and prevents the growth of unwanted microorganisms. The content of free and total sulfur (exact: sulfur dioxide) is determined through the titration of a 10-50 ml sample after the addition of sulfuric acid and potassium iodide with an iodine solution (e.g. 0.025 mol/l) and using a double platinum electrode as the indication electrode. The free  $\text{SO}_2$  is titrated directly. The total  $\text{SO}_2$  is titrated after the hydrolysis with sodium hydroxide which converts the bounded  $\text{SO}_2$  into the free form. The method with all parameters and calculation formula is already stored as a standard method in the TitroLine® 7000 and can be used directly.

▲ Typical applications of food analysis:

- Salt content (chloride, sodium chloride)
- pH-value, total acidity in wine, beverages and food products such as condiments
- Formol number in fruit and vegetable juices
- Ascorbic acid (Vitamin C)
- Calcium in milk and dairy products
- Protein determination (Kjeldahl-nitrogen) in milk and dairy products
- Reducing sugar in wine and juices
- Iodine number, peroxide number, free fatty acids and saponification number
- Determination of free and total sulfurous acid ( $\text{H}_2\text{SO}_3$ ) in wine and grape must. Further detail is available in the application example.

## ▶ Titrations with the new photometric sensor OptiLine 6

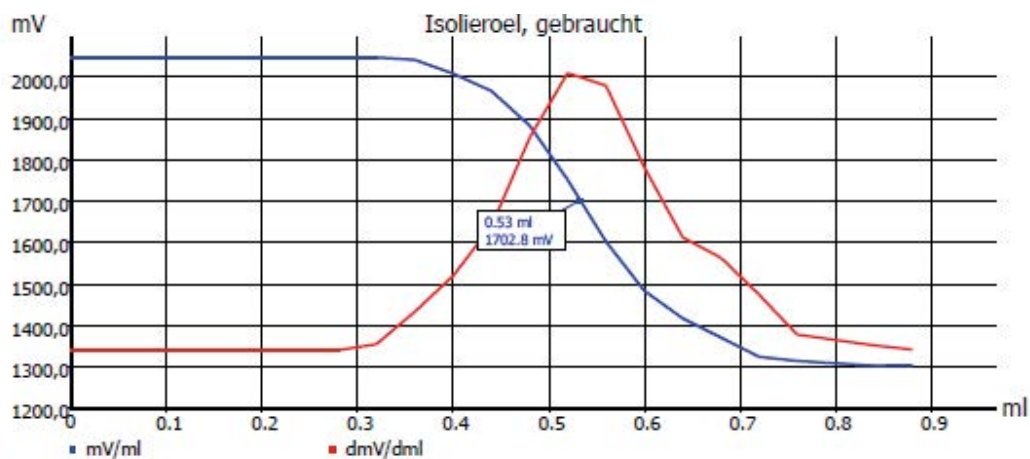
The TitroLine<sup>®</sup> 7000 allows the connection of the new OptiLine 6 (please see also page 82) photometric sensor via USB. The TitroLine<sup>®</sup> 7000 uses the digital USB input to set the wavelength and other parameters of the photometric sensor.



OptiLine 6

With the OptiLine 6, the following applications are possible:

- All complexometric titrations of metals such as calcium, magnesium (total hardness), zinc, copper etc.
- All titrations with color indicator, which are prescribed in the Ph. Eur., USP, and further pharmacopeials  
These titrations can now be performed automatically
- Turbidity titration of Chondroitin sulphate according to Ph. Eur. and USP
- Titration of Total acid - or Basen number (TAN and TBN) using the color indicator method
- Determination of carboxyl end groups in polyethylene terephthalate (PET)
- For further application examples please see page 83



Titration curve: TAN acc. to ASTM D974



## 4.3 TitroLine® 7500 KF and TitroLine® 7500 KF *trace* -

You can't go wrong with the latest TitroLine® KF titrators from YSI

The TitroLine® 7500 KF is the volumetric generalist for a wide range of use, where the TitroLine® 7500 KF *trace* is the specialist for low water contents. Both new titrators are characterized by the following features and benefits:

- ▶ Fast, easy and precise
- ▶ Include standard methods for different applications (Titer, blank value, 1 or 2 component reagent)
- ▶ The addition of solvent and the extraction of the titrated sample are managed by the titration stand TM 235 KF (optional for TitroLine® 7500 KF *trace*)
- ▶ Online display of curve and measurement drift during titration

Benefits  
TitroLine® KF (*trace*)

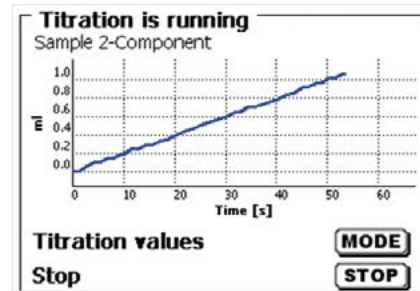


TitroLine® 7500 KF *trace*

# Karl Fischer - Titration made easy

## Live Titration Curve

The online display of the measurement curve, measurement drift and titration solvent consumption (TitroLine® 7500 KF only) make accurate monitoring of the titration possible and allows the immediate determination of any unwanted side reactions.



TitroLine® 7500 KF

## 4.4 TitroLine® 7750 - The total solution

The TitroLine® 7750 can be utilized for both potentiometric titration and volumetric KF titration. The TitroLine® 7750 combines the features of the potentiometric titrator TitroLine® 7000 and the volumetric Karl Fischer titrator TitroLine® 7500.



# The titrator with more options

- ▶ Storage of results using USB port (PDF - and CSV -format) including method transfer
- ▶ Includes standard methods for potentiometric and KF titration
- ▶ Highly visible full color display, that can be easily viewed from a distance and extreme angles
- ▶ New interchangeable modules in which all relevant reagent and unit data can be stored
- ▶ Expandable with the 2 x USB-host, 1 x USB-PC, 1 x LAN and 2 x RS232 ports
- ▶ Connectable to USB keyboard, USB printer, barcode reader, USB flash drives, balances, PC and further devices such as piston burettes and autosamplers
- ▶ Storage of results via USB or LAN connection, including method transfer

*TitroLine® 7750 with accessories for KF titration*



## 4.5 TitroLine® 7800 - The universal titrator with IDS technology

The TitroLine® 7800 enhanced the universal features of the TitroLine® 7750 with an additional IDS measurement input, so it is able to perform potentiometric titrations with analog or IDS electrodes up to volumetric Karl Fischer titrations. The IDS measuring input is multifunctional. Digital sensors for the determination of pH and ORP values and the conductivity of dissolved oxygen can be connected.

IDS stands for "intelligent, digital sensors" and means the analog measurement signal is converted into a digital measurement value in the sensor. This protects the signal from external interferences, such as moisture, electro-magnetic fields or pulses. More precise measurements mean more accurate readings.

*TitroLine® 7800 with accessories*



- ▶ Highly visible full-color display can be easily viewed from a distance and extreme angles
- ▶ Includes new interchangeable modules in which all relevant reagent and unit data can be stored
- ▶ Expandable with the 2 x USB-host, 1 x USB-PC, 1 LAN and 2 x RS232 ports. Connectable to USB keyboard, USB printer, barcode reader, USB flash drives, balances, PC and further SI Analytics devices such as piston burettes and autosamplers
- ▶ Storage of results using via USB port (PDF - and CSV -format) including method transfer
- ▶ Includes standard methods for potentiometric and KF titration
- ▶ Second digital measuring port for intelligent digital sensors (IDS)

## Benefits TitroLine® 7800



# TitroLine<sup>®</sup> 7800 - Featuring enhanced automation and additional methods

In addition to the high-level TitroLine series specifications, the TitroLine<sup>®</sup> 7750 & 7800 models provide even more functionality.

## Measurement and calibration with the highest accuracy

The wireless sensor recognition automatically recognizes SI Analytics ID and IDS electrodes, which instantly send the specific data to the titrator. Therefore TitroLine<sup>®</sup> 7800 always uses correct calibration data. Erroneous measurements are eliminated.



Rear panel

## Ideal for measurements and titration tasks with pH and Conductivity

The TitroLine® 7800 is ideally suited for water analysis. A typical example is the pH and conductivity measurement. Subsequently, as a rule, the Alkalinity or Carbonate/Hydrogen carbonate hardness is determined.

Conductivity and temperature are measured immediately after the two measuring electrodes are immersed in the sample. This will take a few seconds. Then the pH value is determined by drift control. This can take more than a minute for low-ion water samples. There is no mutual influence on the pH and the LF value due to the use of the digital conductivity electrode. The acid capacity  $KS_{8.2}$  and  $KS_{4.3}$  are then titrated with hydrochloric acid 0.02-0.1 mol / l. The titration is carried out to a pH of 4.3 (4.5) and the consumption is determined at pH 8.2 and 4.3 (or 4.5).

End of titration 1 of 4	
Alkalinity (p+m) - Probe	
EP1	0.000 ml / pH 8.200
p-value	0.00 mmol/l
EP2	2.178 ml / pH 4.300
m-value	2.18 mmol/l
<b>next Page</b>	<b>MODE</b>
<b>Back</b>	<b>ESC</b>

End of titration 2 of 4	
Alkalinity (p+m) - Probe	
Start pH (A)	pH 7.429
Start tempe...	22.7 °C
Start cond. ...	357.2 $\mu$ S/cm
Start tempe...	22.7 °C
<b>next Page</b>	<b>MODE</b>
<b>Back</b>	<b>ESC</b>

This application is very easy to automate with a sample changer. If many samples have to be measured per day, the TW 7400-42 or the TW 7400-48 are used. It is also possible to calibrate the pH electrode in the sample changer at startup.



# 4.6 TITRONIC® 500 and TitroLine® Specifications

Features	TITRONIC® 500	TitroLine® 7000
<b>Analog measuring inputs</b>		
Measuring input 1 (analog) pH/mV with reference electrode input	—	pH/mV-input with 24 bit transducer electrode socket according to DIN 19 262 or additional with BNC socket insert RFID receiver for SI Analytics ID electrodes
Measuring range pH	—	-3.0 to 18.00
Display resolution pH / Accuracy pH (without sensor probe)	—	0.001 / 0.002 ± 1 Digit
Measuring range mV	—	-2000 to 2000
Display resolution mV / Accuracy mV (without sensor probe)	—	0.1 / 0.1 ± 1 Digit
<b>Analog measuring inputs - Dead Stop</b>		
Measuring input dead stop (2 x 4 mm socket)	—	Connector (µA) for double platinum electrodes Polarisation voltage adjustable from 40 to 220 mV
Display resolution µA / Accuracy µA (without sensor probe)	—	0.1 / 0.2 ± 1 digit
Measuring input temperature (2 x 4 mm socket)	—	Connector for Pt 1000 / NTC 30kΩ
Measuring range temperature °C	—	Pt 1000: -75 to 195 / NTC 30kΩ -40...125°C
Display resolution °C / Accuracy °C (without sensor probe)	—	0.1 / Pt 1000: 0.2 K ± 1 Digit   NTC 30kΩ: 1.0 K (-40...0°C)/0.3 K (0...125 °C) ± 1 Digit
<b>Digital measuring inputs</b>		
Measuring input 2 (IDS)	—	—
pH range	—	—
mV range	—	—
Temperature °C range	—	—
Conductivity range	—	—
Display	3.5 inches -1/4 VGA TFT display with 320 x 240 pixels	3.5 inches -1/4 VGA TFT display with 320 x 240 pixels
Housing material	Polypropylene	Polypropylene
Front keyboard	Polyester coated	Polyester coated
Housing dimensions	15.3 x 45 x 29.6 cm (W x H x D), height with interchangeable unit	15.3 x 45 x 29.6 cm (W x H x D), height with interchangeable unit
Weight	2.2 kg for basic unit 3.5 kg for complete device incl. interchangeable unit (with empty reagent bottle, without magnetic stirrer)	2.3 kg for basic unit 3.5 kg for complete device incl. interchangeable unit (with empty reagent bottle, without magnetic stirrer)
Ambient conditions	Ambient temperature: + 10 to + 40 °C for operation and storage	Ambient temperature: + 10 to + 40 °C for operation and storage
Material: intelligent interchangeable units (5, 10, 20 and 50 ml)	Valve: PTFE/ETFE Cylinder: borosilicate glass 3.3 (DURAN®) Hoses: FEP, blue	Valve: PTFE/ETFE Cylinder: borosilicate glass 3.3 (DURAN®) Hoses: FEP, blue
Dosing accuracy according DIN EN ISO 8655, part 3	Accuracy : 0.15 % Precision: 0.05 - 0.07 % (Depending on the used interchangeable unit)	Accuracy : 0.15 % Precision: 0.05 - 0.07 % (Depending on the used interchangeable unit)

TitroLine® 7500 KF		TitroLine® 7500 KF trace		TitroLine® 7750		TitroLine® 7800	
—	—	—	—	pH/mV-input with 24 bit transducer Electrode socket according to DIN 19 262 or additional with BNC socket insert RFID receiver for SI Analytics ID electrodes	pH/mV-input with 24 bit transducer Electrode socket according to DIN 19 262 or additional with BNC socket insert RFID receiver for SI Analytics ID electrodes	—	—
—	—	—	—	-3.0 to 18.00	-3.0 to 18.00	—	—
—	—	—	—	0.001 / 0.002 ± 1 Digit	0.001 / 0.002 ± 1 Digit	—	—
—	—	—	—	-2000 to 2000	-2000 to 2000	—	—
—	—	—	—	0.1 / 0.1 ± 1 Digit	0.1 / 0.1 ± 1 Digit	—	—
Connector (µA) for double platinum electrodes Polarisation voltage adjustable from 40 to 220 mV	Connector (µA) for double platinum electrodes	Connector (µA) for double platinum electrodes Polarisation voltage adjustable from 40 to 220 mV	Connector (µA) for double platinum electrodes Polarization voltage adjustable from 40 to 220 mV	0.1 / 0.2 ± 1 Digit	0.1 / 0.2 ± 1 Digit	0.1 / 0.2 ± 1 Digit	0.1 / 0.2 ± 1 Digit
—	—	—	—	Connector for Pt 1000 / NTC 30kΩ	Connector for Pt 1000 / NTC 30kΩ	—	—
—	—	—	—	Pt 1000: -75 to 195 / NTC 30kΩ - 40 - 125 °C	Pt 1000: -75 to 195 / NTC 30kΩ - 40 - 125 °C	—	—
—	—	—	—	0.1 / Pt 1000: 0.2 K ± 1 Digit   NTC 30kΩ: 1.0 K (-40 - 0 °C) / 0.3 K (-125 °C) ± 1 Digit	0.1 / Pt 1000: 0.2 K ± 1 Digit   NTC 30kΩ: 1.0 K (-40 - 0 °C) / 0.3 K (-125 °C) ± 1 Digit	—	—
—	—	—	—	—	—	Accuracy ± 1 digit depending on the used IDS electrode	Accuracy ± 1 digit depending on the used IDS electrode
—	—	—	—	—	—	0.000 to 14.000 ± 0.004 pH	0.000 to 14.000 ± 0.004 pH
—	—	—	—	—	—	± 1200.0 mV ± 0.2 mV	± 1200.0 mV ± 0.2 mV
—	—	—	—	—	—	-5.0 - 105.0 °C ± 0.2 mV	-5.0 - 105.0 °C ± 0.2 mV
—	—	—	—	—	—	0.00 - 2000 mS/cm ± 0.5% v. Mw.	0.00 - 2000 mS/cm ± 0.5% v. Mw.
3.5 inches -1/4 VGA TFT display with 320 x 240 pixels	3.5 inches -1/4 VGA TFT display with 320 x 240 pixels	3.5 inches -1/4 VGA TFT display with 320 x 240 pixels	3.5 inches -1/4 VGA TFT display with 320x240 pixels	3.5 inches -1/4 VGA TFT display with 320 x 240 pixels	3.5 inches -1/4 VGA TFT display with 320x240 pixels	3.5 inches -1/4 VGA TFT display with 320x240 pixels	3.5 inches -1/4 VGA TFT display with 320x240 pixels
Polypropylene	Polypropylene	Polypropylene	Polypropylene	Polypropylene	Polypropylene	Polypropylene	Polypropylene
Polyester coated	Polyester coated	Polyester coated	Polyester coated	Polyester coated	Polyester coated	Polyester coated	Polyester coated
15.3 x XX x 29.6 cm (W x H x D), height with interchangeable unit	15.3 x 45 x 29.6 cm (W x H x D)	15.3 x 45 x 29.6 cm (W x H x D), height with interchangeable unit	15.3 x 45 x 29.6 cm (W x H x D), height with interchangeable unit	15.3 x 45 x 29.6 cm (W x H x D), height with interchangeable unit	15.3 x 45 x 29.6 cm (W x H x D), height with interchangeable unit	15.3 x 45 x 29.6 cm (W x H x D), height with interchangeable unit	15.3 x 45 x 29.6 cm (W x H x D), height with interchangeable unit
2.3 kg for basic unit 3.5 kg for complete device incl. interchangeable unit (with empty reagent bottle, without magnetic stirrer or TM 235 KF)	2.3 kg for basic unit without magnetic stirrer TM 235 or TM 235 KF	2.3 kg for basic unit 3.5 kg for complete device incl. interchangeable unit (with empty reagent bottle, without magnetic stirrer or TM 235 KF)	2.3 kg for basic unit 3.5 kg for complete device incl. interchangeable unit (with empty reagent bottle, without magnetic stirrer or TM 235 KF)	2.3 kg for basic unit 3.5 kg for complete device incl. interchangeable unit (with empty reagent bottle, without magnetic stirrer or TM 235 KF)	2.3 kg for basic unit 3.5 kg for complete device incl. interchangeable unit (with empty reagent bottle, without magnetic stirrer or TM 235 KF)	2.3 kg for basic unit 3.5 kg for complete device incl. interchangeable unit (with empty reagent bottle, without magnetic stirrer or TM 235 KF)	2.3 kg for basic unit 3.5 kg for complete device incl. interchangeable unit (with empty reagent bottle, without magnetic stirrer or TM 235 KF)
Ambient temperature: + 10 to + 40 °C for operation and storage	Ambient temperature: + 10 to + 40 °C for operation and storage	Ambient temperature: + 10 to + 40 °C for operation and storage	Ambient temperature: + 10 to + 40 °C for operation and storage	Ambient temperature: + 10 to + 40 °C for operation and storage	Ambient temperature: + 10 to + 40 °C for operation and storage	Ambient temperature: + 10 to + 40 °C for operation and storage	Ambient temperature: + 10 to + 40 °C for operation and storage
Valve: PTFE/ETFE Cylinder: borosilicate glass 3.3 (DURAN®) Hoses: FEP, blue	—	Valve: PTFE/ETFE Cylinder: borosilicate glass 3.3 (DURAN®) Hoses: FEP, blue	—	Valve: PTFE/ETFE Cylinder: borosilicate glass 3.3 (DURAN®) Hoses: FEP, blue	—	Valve: PTFE/ETFE Cylinder: borosilicate glass 3.3 (DURAN®) Hoses: FEP, blue	—
Accuracy : 0.15 % Precision: 0.05 - 0.07 % (Depending on the used interchangeable unit)	—	Accuracy : 0.15 % Precision: 0.05 - 0.07 % (Depending on the used interchangeable unit)	—	Accuracy : 0.15 % Precision: 0.05 - 0.07 % (Depending on the used interchangeable unit)	—	Accuracy : 0.15 % Precision: 0.05 - 0.07 % (Depending on the used interchangeable unit)	—

# 4.7 Ordering information: TITRONIC® 500, TitroLine® 7000/7500/7750/7800

Type No.	Order No.	Description
T 500-M1	285230190	TITRONIC® 500 basic unit with magnetic stirrer TM 235, with stand rod TZ 1510, electrode clamp Z 305, hand controller TZ 3880, power supply 100-240 V
T 500-M2/20	285230200	TITRONIC® 500 basic unit with magnetic stirrer TM 235 and 20 ml exchange unit WA 20, with stand rod TZ 1510, electrode clamp Z 305, hand controller TZ 3880, power supply 100-240 V
TL 7000-M1/10	285230240	TitroLine® 7000 basic unit with magnetic stirrer TM 235 and 10 ml exchangeable unit WA 10, with brown glass bottle for titrant, GL 45 and S 40-bottle adapter, tubes, drip tube and titration tip
TL 7000-M1/20	285230250	TitroLine® 7000 basic unit with magnetic stirrer TM 235 and 20 ml exchangeable unit WA 20, with brown glass bottle for titrant, GL 45 and S 40-bottle adapter, tubes, drip tube and titration tip
TL 7000-M1/50	285230260	TitroLine® 7000 basic unit with magnetic stirrer TM 235 and 50 ml exchangeable unit WA 50, with brown glass bottle for titrant, GL 45 and S 40-bottle adapter, tubes, drip tube and titration tip
TL 7000-M2/20	285230270	TitroLine® 7000 basic unit with magnetic stirrer TM 235 and 20 ml exchangeable unit WA 20, with brown glass bottle for titrant, GL 45 and S 40-bottle adapter, tubes, drip tube and titration tip. With pH-combination electrode and buffer set.
TL 7000-TitriSoft	285230280	Basic unit with magnetic stirrer TM 235, with stand rod and titration clamp Z 305, power supply 100-240 V, software TitriSoft 3.3 (TZ 3071)
TL 7500 KF 05	285230360	Volumetric KF-Titrator, scope of supply: basic titrator unit, exchange unit WA 05, TM 235 KF titration stand with integrated stirrer and pump, titration vessel TZ 1770, micro double platinum electrode KF 1100 and starter kit, power supply 100-240 V
TL 7500 KF 10	285230370	Volumetric KF-Titrator, scope of supply: basic titrator unit, exchange unit WA 10, TM 235 KF titration stand with integrated stirrer and pump, titration vessel TZ 1770, micro double platinum electrode KF 1100 and starter kit, power supply 100-240 V
TL 7500 KF 20	285230380	Volumetric KF-Titrator, scope of supply: basic titrator unit, exchange unit WA 20, TM 235 KF titration stand with integrated stirrer and pump, titration vessel TZ 1770, micro double platinum electrode KF 1100 and starter kit, power supply 100-240 V
TL 7500 KF trace M1	285230410	Module 1, coulometric KF-Titrator, scope of supply: basic titrator unit, generator electrode TZ 1752 without junction + connection cable, magnetic stirrer TM 235, stand rod, titration vessel TZ 1751, micro double platinum electrode KF 1150
TL 7500 KF trace M2	285230420	Module 2, coulometric KF-Titrator, scope of supply: basic titrator unit, generator electrode TZ 1752 without junction + connection cable, TM 235 KF titration stand with integrated stirrer and pump, stand rod, titration vessel TZ 1754, micro double platinum electrode KF 1150
TL 7500 KF trace M3	285230430	Module 3, coulometric KF-Titrator, scope of supply: basic titrator unit, generator electrode TZ 1753 with junction + connection cable, magnetic stirrer TM 235, stand rod, titration vessel TZ 1751, micro double platinum electrode KF 1150
TL 7500 KF trace M4	285230440	Module 4, coulometric KF-Titrator, scope of supply: basic titrator unit, generator electrode TZ 1753 with junction + connection cable, TM 235 KF titration stand with integrated stirrer and pump, stand rod, titration vessel TZ 1754, micro double platinum electrode KF 1150
TL 7500 KF trace M5	285230450	Module 5, coulometric KF-Titrator, scope of supply: basic titrator unit, generator electrode TZ 1752 without junction + connection cable, magnetic stirrer TM 235, stand rod, titration vessel TZ 1754, micro double platinum electrode KF 1150
TL 7750-M1	285230480	Basic unit with magnetic stirrer TM 2325, with stand rod; TZ 1510, electrode clamp Z 305, hand controller TZ 3880, power supply 100-240 V
TL 7750 KF 05	285230490	TitroLine® 7750 with KF accessories, scope of supply: basic titrator unit, exchange unit WA 05, TM 235 KF titration stand with integrated stirrer and pump, titration vessel TZ 1770, micro double platinum electrode KF 1100 and starter kit, power supply 100-240 V
TL 7750 KF 10	285230500	TitroLine® 7750 with KF accessories, scope of supply: basic titrator unit, exchange unit WA 10, TM 235 KF titration stand with integrated stirrer and pump, titration vessel TZ 1770, micro double platinum electrode KF 1100 and starter kit, power supply 100-240 V
TL 7750 KF 20	285230510	TitroLine® 7750 with KF accessories, scope of supply: basic titrator unit, exchange unit WA 20, TM 235 KF titration stand with integrated stirrer and pump, titration vessel TZ 1770, micro double platinum electrode KF 1100 and starter kit, power supply 100-240 V
TL 7750-TitriSoft	285230520	Basic unit with magnetic stirrer TM 235, with stand rod and titration clamp Z 305, power supply 100-240 V, software TitriSoft 3.3 (TZ 3071)
TL 7800	285230540	TitroLine® 7800 basic unit with two measuring inputs, one analog and one digital (IDS) measuring input
TL 7800-M1	285230550	TitroLine® 7800 basic unit with two measuring inputs, one analog and one digital (IDS) measuring input, with magnetic stirrer TM 235
TL 7800-TitriSoft	285230560	Basic unit with two measuring inputs, one analogue and one ein digital (IDS) measuring input, with magnetic stirrer TM 235 and TitriSoft 3.2

# Accessories for TITRONIC® 500, TitroLine® 7000/7500/7750/7800

Type No.	Order No.	Description
WA 05	285220300	5 ml exchangeable unit with integrated chip for reagent data, with brown glass bottle for titrant, GL 45 and S 40-bottle adapter, tubes, drip tube and titration tip
WA 10	285220310	10 ml exchangeable unit with integrated chip for reagent data, with brown glass bottle for titrant, GL 45 and S 40-bottle adapter, tubes, drip tube and titration tip
WA 20	285220320	20 ml exchangeable unit with integrated chip for reagent data, with brown glass bottle for titrant, GL 45 and S 40-bottle adapter, tubes, drip tube and titration tip
WA 50	285220350	50 ml exchangeable unit with integrated chip for reagent data, with brown glass bottle for titrant, GL 45 and S 40-bottle adapter, tubes, drip tube and titration tip
TM 235, 115-230 V	285220400	Magnetic stirrer for vessels up to 500 ml, agitator speed infinitely adjustable from 500 - 2000 r/min, for the connection to TitroLine® 6000/7000 and TITRONIC® 500
TM 235 KF, 115-230 V	285220900	Titration stand with pump; Scope of delivery: Basic unit with 1 l DURAN®-reagent bottle TZ 1791, 1 l DURAN®-waste bottle TZ 1792, moisture bottle, tubes and screw threads, power supply TZ 1855 (110 to 240 V)
TZ 1052	285214721	KF-drying stove, 230 V
TZ 1055	285215183	KF-drying stove, 115 V
TZ 1060	285218115	Accessories set for KF drying stove TZ 1052/TZ1055
TZ 1065	285201973	Flowmeter with valve and hose connectors for gas volumes (air, nitrogen) from 50 - 500 ml/min.
KF 1100	285102030	Micro double platinum electrode for Karl Fischer titrations, with fixed cable, double platinum pin and tapper NS 7.5 for TZ 1770 and TZ 1772
TZ 1748	285216560	Stand rod stainless steel Ø 10 mm
TZ 1770	285216677	Karl Fischer titration vessel. DURAN® glass vessel TZ 1775 (approx. 30..150 ml), removable head made of polypropylene/PTFE, 1 drilling NS 19, NS 14,5, NS 7,5 and 3 drillings with screw threads, titration tip, moisture trap and weighing funnel
TZ 1789	285221120	Starter kit KF consisting of molecular sieve, needles with syringes and glass wool
TZ 3863	285220480	USB-thermo printer, 112 mm for TitroLine® 6000/7000/7500 KF/7500 KF trace/7750 and TITRONIC® 500
TZ 3864	285220710	Thermal paper for TZ 3863 with very high durability (5 rolls)
TZ 3865	285220440	DIN A4 standard printer, HP PCL-compatible, with USB-connection cable, 230 V

# 5.1 TW alpha plus autosampler

The number of samples to be processed is growing constantly as are the demands on reliability in accordance with GLP and ISO 900X standards. The TW *alpha* plus and the TW 7400 autosamplers by Yellow Springs Instruments help you meet these increased requirements and relieve qualified employees from routine work.

## Control by titrator or by PC

You can control the autosampler from the TitroLine® 7000/7750/7800 titrator or from a PC with the TitrifSoft software.

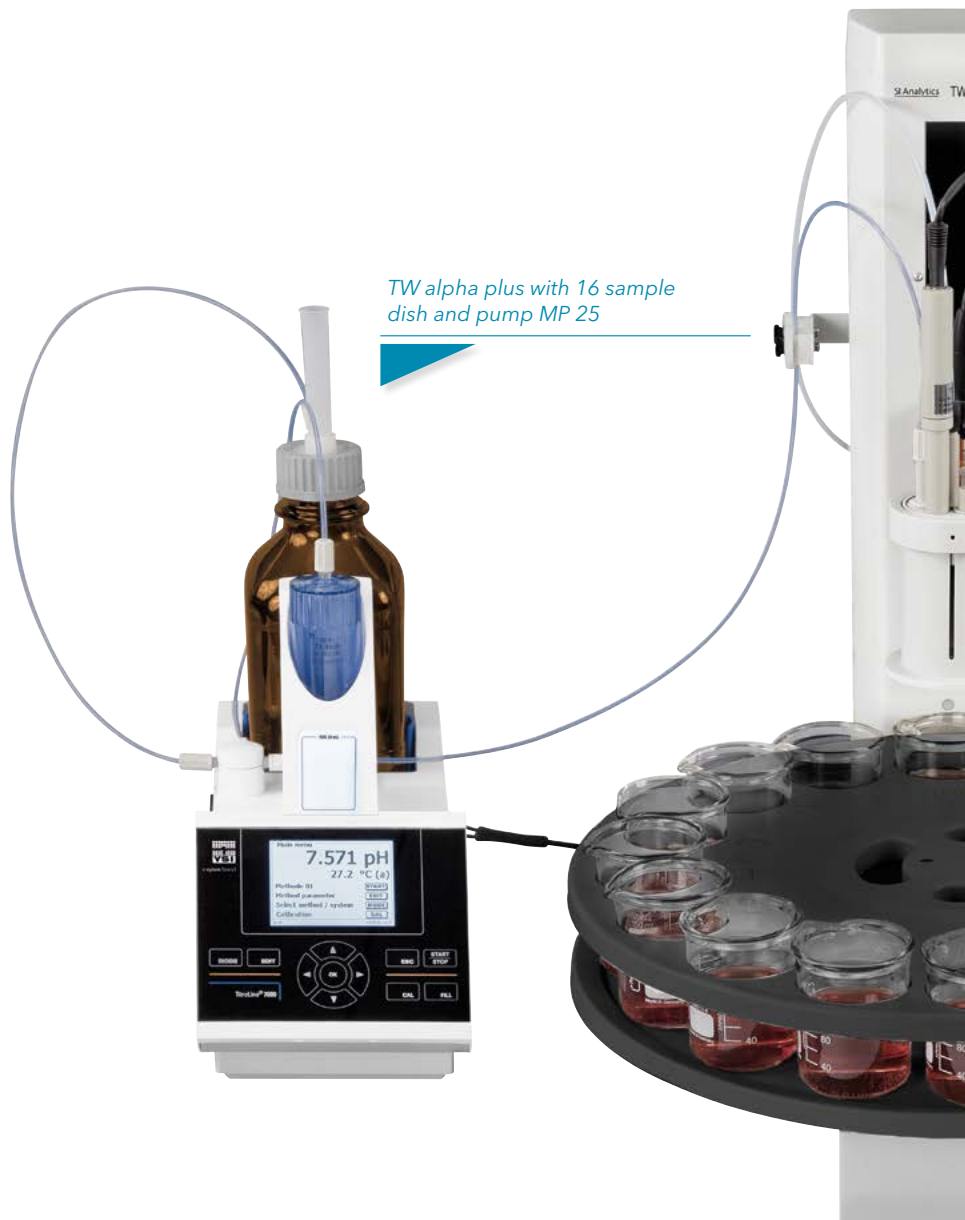
## Higher flexibility due to exchangeable sample racks

With four sample racks for up to 72 samples (TW 7400) and titration head fittings for a variety of beaker and titrator vessels, you get the flexibility your lab needs. The sample racks and titrator heads are very quick and simple to change. The size of the rack can be selected in the TitroLine® 7000/7750/7800 or in the Titration Center of the TitrifSoft software.

## Stirring from "above" or "below"

As standard, the TW *alpha* plus comes with an integrated magnetic stirrer to stir the samples from "below". Alternatively, you can use a rod stirrer which enables stirring from "above". TW 7400 always stirs from "above".

TW alpha plus with 16 sample dish and pump MP 25



# Autosampler - automatic titration in series



*TW alpha plus with sample dish for COD vessels after DIN*

## Washing the electrode and the titration tip

To ensure accurate results, the electrodes and the titration tips are rinsed after each titration. This can, for example, be done by immersing the electrodes and titration tips into a washing solution. The number of rinsing positions to be used (up to a maximum of three) and the rinsing time are set in the method. Direct and fast rinsing of the electrodes and titration tips can be ensured by using the MP 25 washing unit that rinses directly after the titration. In addition to this, a waiting position may also be used, for example, to immerse the pH electrodes into a KCl solution.

Sample Changer

## Automatic COD Titration

For the direct titration of the COD, there is a special sample tray for TW alpha plus with 24 positions available.



## 5.2 TW 7400 Autosampler - large sample throughput

The new X / Y autosampler TW7400 has been developed for high sample throughput. There are three different sample rack sizes of 42, 48 and 72 positions, and three different titration heads available.

Both the sample racks and the titration heads are easily exchanged. The sample rack with the 42 positions can be operated with beakers of either 150 or 250 ml volume. These are used specifically in the water and environmental analysis. With this sample rack, the use of the irrigation pump MP 25 is recommend. The sample rack with 72 positions can be operated with beakers of 50 ml and special sample containers for a sample volume up to approximately 75 ml. Typical applications include the wine and beverage analysis, pH measurements in soil samples or the determination of the alkalinity in seawater.

The sample with 48 positions is suitable for 100 ml beakers especially used for wine analysis.

### TW *alpha plus* and TW7400 selection table

Feature/Accessory	TW <i>alpha plus</i>	TW 7400
Stirring from the bottom with built-in magnetic stirrer	■	—
Rod stirrer TZ 1847 Suitable for all sample racks besides COD	■	■
Rod stirrer TZ 1846 Suitable only for COD sample rack	■	—
Rinsing pump MP 25. Suitable for sample racks: TZ 1452, TZ 1459 und TZ 3942	■	■
Sample rack for 12 positions TZ 1452 Suitable for titration vessel 250 ml low form (scope of supply) and 400 ml tall form	■	—
Sample rack for 12 positions TZ 1453 Suitable for titration vessel 600 ml tall form TZ 1766	■	—
Sample rack for 16 positions TZ 1457 Suitable for titration vessel 100 ml tall form (scope of supply)	■	—
Sample rack for 16 positions TZ 1459 Suitable for titration vessel 150 ml low form (scope of supply) and 250 ml tall form	■	—
Sample rack for 16 positions TZ 1458 Suitable for 100 ml laboratory bottles TZ 1494	■	—
Sample rack for 24 positions TZ 1454 Suitable for titration vessel 50 ml tall form (scope of supply) and titration vessel up to 75 ml sample volume (TZ 1786) and titration vessel TZ 3973 (PP)	■	—
Sample rack for 24 positions TZ 1444 Suitable for COD sample vessel 100 ml according to DIN (not included in scope of supply!)	■	—
Titration head TZ 1463 with 7 openings NS 14 Suitable for sample rack TZ 1459 and TZ 1452	■	—
Titration head TZ 1464 with 4 openings NS 14, splash Suitable for sample rack TZ 1457 and TZ 1459	■	—
Titration head TZ 1467 with 7 openings NS 14, splash shield and rinsing spray Suitable for sample rack TZ 1459 and TZ 1452 in combination with rinsing pump MP 25	■	—
Micro-titration head TZ 1469 with 4 openings Suitable for sample rack TZ 1454	■	—
COD titration head TZ 1461 with 3 openings Suitable for COD sample rack TZ 1444.	■	—
Sample rack for 42 position TZ 3942 Suitable for titration vessel 150 ml low form (scope of supply) and 250 ml tall form	—	■
Sample rack for 48 positions TZ 3948 Suitable for titration vessel 100 ml tall form (scope of supply)	—	■
Sample rack for 72 positions TZ 3972 Suitable for titration vessel 50 ml tall form (scope of supply) and titration vessel for up to 75 ml sample volume (TZ 1786)	—	■
Titrierkopf TZ 3963 with 7 openings NS 14 Suitable for sample rack TZ 3942	—	■
Titration head TZ 3967 with 7 openings NS 14, splash shield and rinsing spray Suitable for sample rack TZ 3942 in combination with rinsing pump MP 25	—	■
Micro-titration head TZ 3969 with 4 openings Suitable for sample rack TZ 3948 and TZ 3972	—	■

Important note: The rinsing pump MP 25 can only be used in combination with the titration heads TZ 1467, TZ 3967 and the sample rack TZ 1452, TZ 1459 and TZ 3942

*TW 7400 with 42 position  
sample rack*



*TW 7400 with 48 position  
sample rack*



*TW 7400 with 72 position  
sample rack*



## 5.3 Ordering information: Autosampler TW *alpha* plus and TW7400

Type No.	Order No.	Description
TW alpha plus, 230 V	1007290	Basic unit with integrated magnetic stirrer, incl. mains cable and connection cable for rod stirrer TZ 1581, 230 V
TW alpha plus, 115 V	1007291	Basic unit with integrated magnetic stirrer, incl. mains cable and connection cable for rod stirrer TZ 1581, 115 V
TW alpha plus 12, 230 V	1007292	Basic unit TW alpha plus with sample rack TZ 1452 for 12 samples, incl. titration head TZ 1463, mains cable, connection cable TZ 3084 and 20 beakers, 250 ml, low form, 230 V
TW alpha plus 12, 115 V	1007293	Basic unit TW alpha plus with sample rack TZ 1452 for 12 samples, incl. titration head TZ 1463, mains cable, connection cable TZ 3084 and 20 beakers, 250 ml, low form, 115 V
TW alpha plus 16, 230 V	1007294	Basic unit TW alpha plus with sample rack TZ 1459 for 16 samples, incl. titration head TZ 1463, mains cable, connection cable TZ 3084 and 20 beakers, 150 ml, low form, 230 V
TW alpha plus 16, 115 V	1007295	Basic unit TW alpha plus with sample rack TZ 1459 for 16 samples, incl. titration head TZ 1463, mains cable, connection cable TZ 3084 and 20 beakers, 150 ml, low form, 115 V
TW alpha plus 16-100, 230 V	285225870	Basic unit TW alpha plus with sample rack TZ 1457 for 16 samples, incl. titration head TZ 1464, mains cable and 20 beakers, 100 ml, tall form, 230 V
TW alpha plus 16-100, 115 V	285225880	Basic unit TW alpha plus with sample rack TZ 1457 for 16 samples, incl. titration head TZ 1464, mains cable and 20 beakers, 100 ml, tall form, 115 V
TW alpha plus 24, 230 V	1007296	Basic unit TW alpha plus with sample rack TZ 1454 for 24 samples, incl. titration head TZ 1469, mains cable, connection cable TZ 3084 and 30 beakers, 50 ml, high form, 230 V
TW alpha plus 24, 115 V	1007297	Basic unit TW alpha plus with sample rack TZ 1454 for 24 samples, incl. titration head TZ 1469, mains cable, connection cable TZ 3084 and 30 beakers, 50 ml, high form, 115 V
TW alpha plus MP, 230 V	1007305	Basic unit TW alpha plus with sample rack TZ 1459 for 16 samples, incl. titration head TZ 1467, washing unit MP 25, mains cable, connection cable TZ 3084 and 20 beakers, 150 ml, low form, 230 V
TW alpha plus MP, 115 V	1007306	Basic unit TW alpha plus with sample rack TZ 1459 for 16 samples, incl. titration head TZ 1467, washing unit MP 25, mains cable, connection cable TZ 3084 and 20 beakers, 150 ml, low form, 115 V
TW alpha plus CSB, 230 V	1007298	Basic unit TW alpha plus with sample rack TZ 1444 for COD-24 samples according to DIN 38 409, incl. titration head TZ 1461, redox electrode Pt 5901, rod stirrer TZ 1846, titration tip TZ 1648, mains cable and connection cable TZ 3084, 230 V
TW alpha plus CSB, 115 V	1007299	Basic unit TW alpha plus with sample rack TZ 1444 for COD-24 samples according to DIN 38 409, incl. titration head TZ 1461, redox electrode Pt 5901, rod stirrer TZ 1846, titration tip TZ 1648, mains cable and connection cable TZ 3084, 115 V
TW 7400	1007400	Basic unit without titration head and sample rack. With connection cable TZ 3987 for the connection on titrator TitroLine® 7XXX, power supply 100-240 V
TW 7400-42	285226600	Basic unit with sample rack TZ 3942 for 42 samples, titration head TZ 3963, rod stirrer TZ 1847 and FEP-hose (5 m), 100-240 V
TW 7400-48	285226620	Basic unit with sample rack TZ 3948 for 48 samples, titration head TZ 3964, rod stirrer TZ 1847 and FEP-hose (5 m), 100-240 V
TW 7400-72	285226630	Basic unit with sample rack TZ 3972 for 72 samples, titration head TZ 3969, rod stirrer TZ 1847 and FEP-hose (5 m), 100-240 V
TW 7400-42 MP	285226610	Basic unit with sample rack TZ 3942 for 72 samples, titration head TZ 3967, rod stirrer TZ 1847, washing unit MP 25 and FEP-hose (5 m), 100-240 V

# Accessories for autosampler TW alpha plus and TW 7400

Type No.	Order No.	Description
TZ 1444	285213836	Sample tray for TW alpha plus for 24 COD vessels according to DIN 38 409
TZ 1452	285214927	Sample tray for TW alpha plus for 12 sample vessels, incl. 20 beakers, 250 ml, low form
TZ 1453	285213853	Sample tray TW alpha plus for 12 sample vessels, incl. 20 beakers, 600 ml, tall form
TZ 1454	285213844	Sample tray for TW alpha plus for 24 sample vessels, incl. 30 beakers, 50 ml, tall form
TZ 1457	285213869	Sample tray for TW alpha plus for 16 sample vessels, incl. 20 beakers, 100 ml, tall form
TZ 1458	285213918	Sample tray for TW alpha plus for 16 sample vessels, incl. 20 laboratory bottles, 100 ml
TZ 1459	285213166	Sample tray for TW alpha plus for 16 sample vessels, incl. 20 beakers, 150 ml, low form
TZ 1463	285213647	Titration head for TW alpha plus for 12 (TZ 1452) and 16 sample rack TZ 1459 with 7 drillings NS 14.5
TZ 1464	285213654	Titration head for sample tray TZ 1457 (16 positions) with 4 apertures different sizes
TZ 1467	285213671	Titration head for TW alpha plus for 12 (TZ 1452) and 16 sample rack TZ 1459 with 7 drillings NS 14.5 incl. splash shield and rinsing spray
TZ 1469	285213884	Titration head for TW alpha plus for 24 pos. sample rack TZ 1454 with 4 openings (2 x NS 14,5 and 2 x NS 7,5) and 1 adapter for micro electrodes with 6 mm diameter.
TZ 3942	285217790	Sample rack for TW 7400 with 42 positions for 150 ml beakers low form or 250 ml beakers tall form
TZ 3948	285217800	Sample rack for TW 7400 with 48 positions for 100 ml beakers low form
TZ 3972	285217810	Sample rack for TW 7400 with 72 positions for 50 ml beakers tall form
TZ 1844	285213199	Rod stirrer mid size model (120 mm) with NS 14.5
TZ 1846	285215134	Rod stirrer long version (200 mm) with NS 14.5 for COD reaction vessels according to DIN 38 409 section 41 for sample changer TW alpha plus
TZ 1847	285215175	Rod stirrer, short version with NS 14,5 for titration head TZ 1463, TZ 1467, TZ 1469, TZ 3942, TZ 3948 and TZ 3972
TZ 1545	285214232	Magnetic stirrer bar, 30 mm, 30 mm, 10 pcs. for TW alpha plus
MP 25	285216005	Membrane pump MP 25 with accessories (5 L - storage bottle, connection tubes, rinsing nozzle, connection cable) for TW alpha/TW alpha plus, 100-240 V

Sample Changer

## Data cables

Type No.	Order No.	Description
TZ 3840	285220690	USB connection cable, Type A (M) --- USB Type B (M), 1,8 m
TZ 3081	1007979	TW alpha plus <-> Mettler AB-S, PG balances, 5 m
TZ 3082	1007977	TW alpha plus <-> Sartorius balances, 5 m
TZ 3087	1007976	TitroLine® 7000, TitroLine® 7750, TitroLine® 7800, TITRONIC® 500 or TITRONIC® 300 <-> TW alpha plus, 1,5 m
TZ 3091	285223504	TITRONIC® 300, TITRONIC® 500 TitroLine® 5000, TitroLine® 6000, 7000, 7750, 7800, 7500 KF, 7500 KF trace <-> PC, 5 m
TZ 3092	285223529	TitroLine® 6000,7000, 7750, 7800, 7500 KF, 7500 KF trace <-> Sartorius balances
TZ 3094	285223545	TITRONIC® 300 <-> TITRONIC® 300, TITRONIC® 500 <-> TITRONIC® 500, TitroLine® 7000 <-> TitroLine® 7000 etc.
TZ 3097	285223578	TITRONIC® 300, TITRONIC® 500 TitroLine® 5000, TitroLine® 6000, 7000, 7750, 7800 7500 KF, 7500 KF trace <-> PC, 1,5 m
TZ 3099	285223594	TitroLine® 6000,7000, 7750, 7800, 7500 KF, 7500 KF trace <-> Mettler AB-S, PG - balances, 1,5 m
TZ 3193	285223600	TITRONIC® 300, TITRONIC® 500 TitroLine® 5000, TitroLine® 6000, 7000, 7750, 7800, 7500 KF, 7500 KF trace <-> PC, 15 m
TZ 3891	285223465	TITRONIC® 300, TITRONIC® 500 TitroLine® 5000, TitroLine® 6000, 7000, 7750, 7800, 7500 KF, 7500 KF trace <-> PC, 5 m
TZ 3987	285217860	TitroLine® 7000, TitroLine® 7750, 7800, 7500 KF, 7500 KF trace, TITRONIC® 500 or TITRONIC® 300 <-> TW 7400, 1,5 m

# 6.1 TitriSoft 3.3 - Convincingly simple with strong benefits

The TitriSoft 3.3 titration software is the optimum solution for your titration tasks. The software can be used with Windows 7, 8.1 and 10 and supports your daily work procedures during sample preparation, titration and evaluation of the results. The software has been developed to be clear, logical and user-friendly.

## Connection possibilities

Using TitriSoft 3.3 you can control the following devices from a PC:

- **Titration burettes** TitroLine® (7000, 7750, 7500 KF, 7500 KF *trace* and *alpha plus*)
- **Autosampler** (TW *alpha plus*, TW 7400, TW *alpha* and TW 280)
- **Piston burettes** TITRONIC® (300, 500 and *universal*, 110/200 and 110 plus)
- **Balances**

You can connect the titration hardware to any of your PC's available USB-A or serial interfaces. Each of the interfaces allows different combinations of devices (configurations). To automate a titration procedure the software may be used to control, for example, a TitroLine® 7800 in connection with the TW *alpha plus* autosampler. For more complex titration tasks with sample preparation you can dose with piston burettes followed by titration with a TitroLine® 7000, 7750 or 7800. Of course, you can also use the software for dosing with piston burettes only.

The image below shows possible device configurations.

## System requirements

For optimal and fast working with the TitriSoft 3.3 software, your system should be equipped as shown below:

**Interface:** A free USB or RS232-interface per configuration

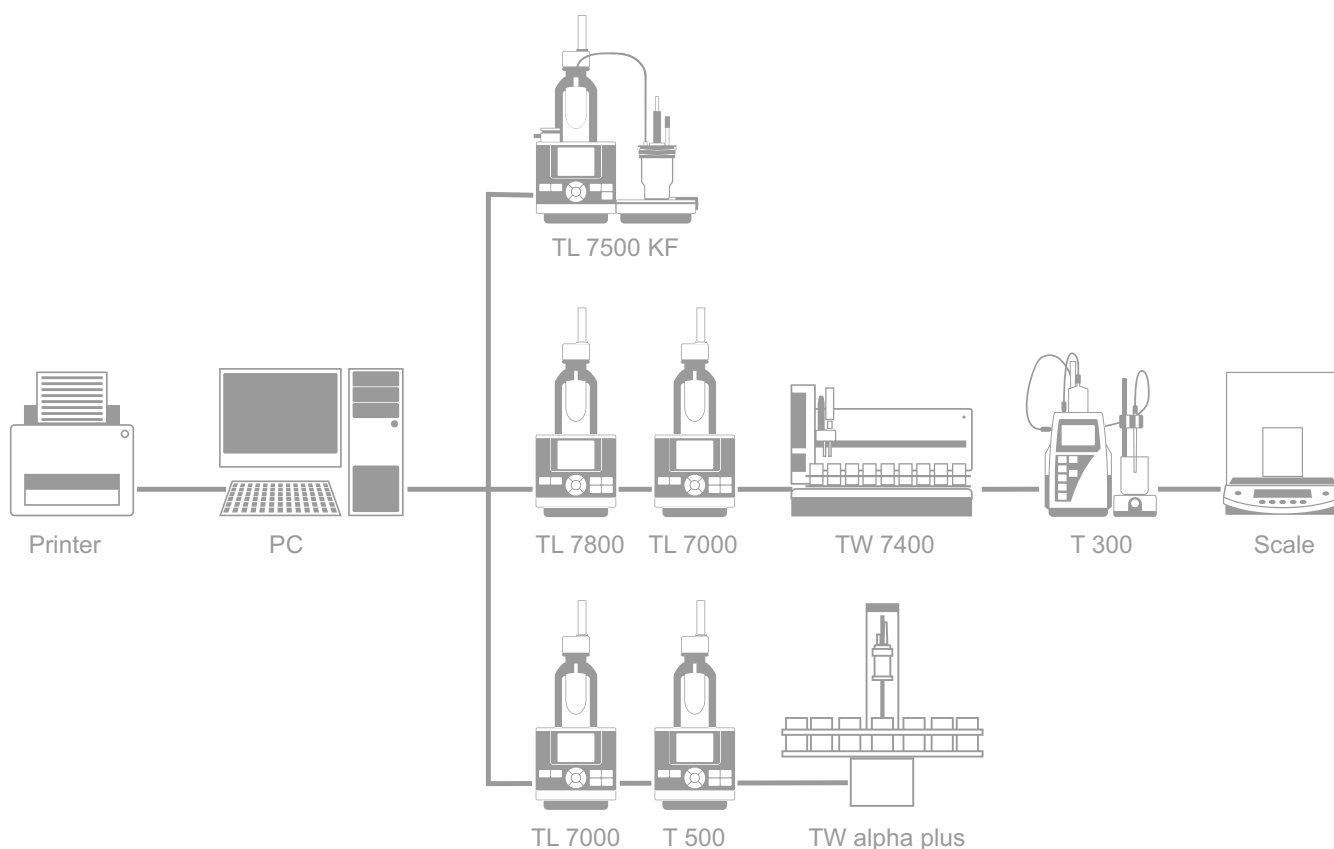
**Computer:** Pentium (Dual-Core) 2 GHz or higher (I3 or higher recommended)

**Operating system:** Windows 7, 8.1 or 10 (32/64 bit)

**RAM:** Minimum 2 GB (4 GB or more recommended)

**Hard disk:**  
Minimum free storage volume 200 MB

**Graphics card:**  
Minimum resolution 1280 x 1024 (1920 x 1200 recommended)



## Titration Center, The Main Menu

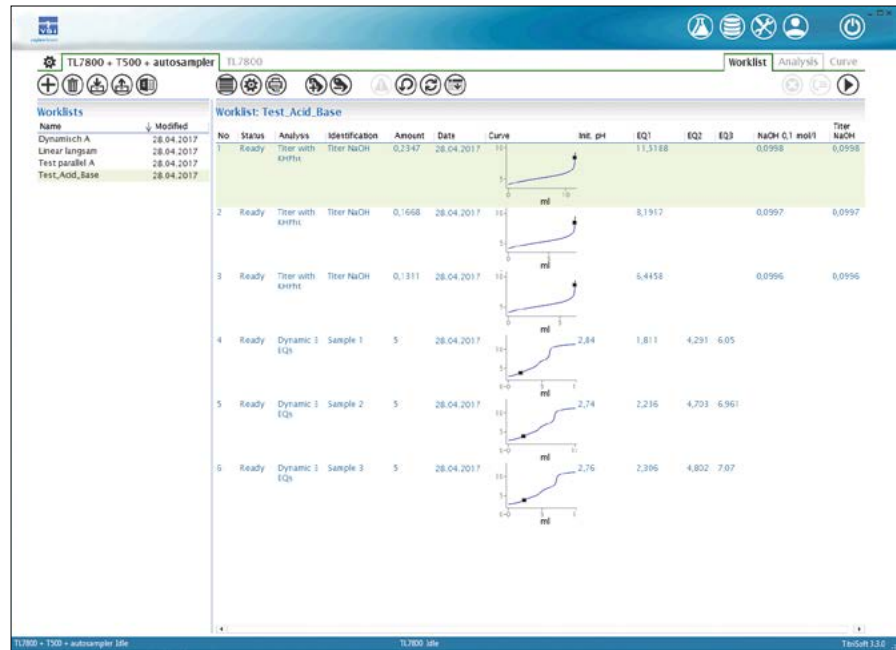
The different software tasks are assigned to five different centers:

- Settings
- Database
- Analysis
- Worklists
- Curve

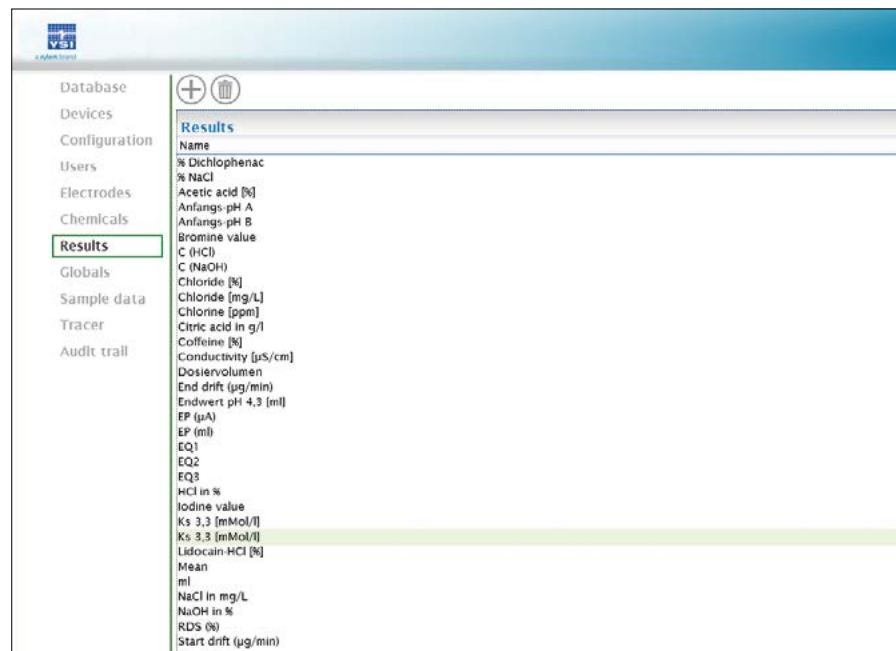
Each of these centers can be chosen at the menu bar.

## Settings, The System Configuration

In the system configuration, the software is set up for operation prior to running the first application, i.e. a configuration is set up with the connected hardware. The configuration of the attached hardware is automatically detected in a hardware scan. Each of these hardware configurations allows any number of "methods" and "work lists". Different configurations can work in parallel (see Connection Possibilities).

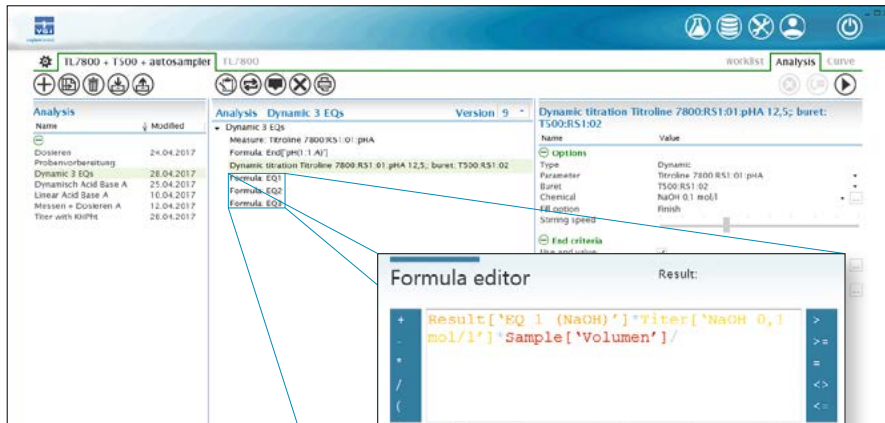


Titration Center



System Configuration

# TitriSoft 3.3



Analysis - Method Center

right:  
Analysis MethodCenter  
Formula editor

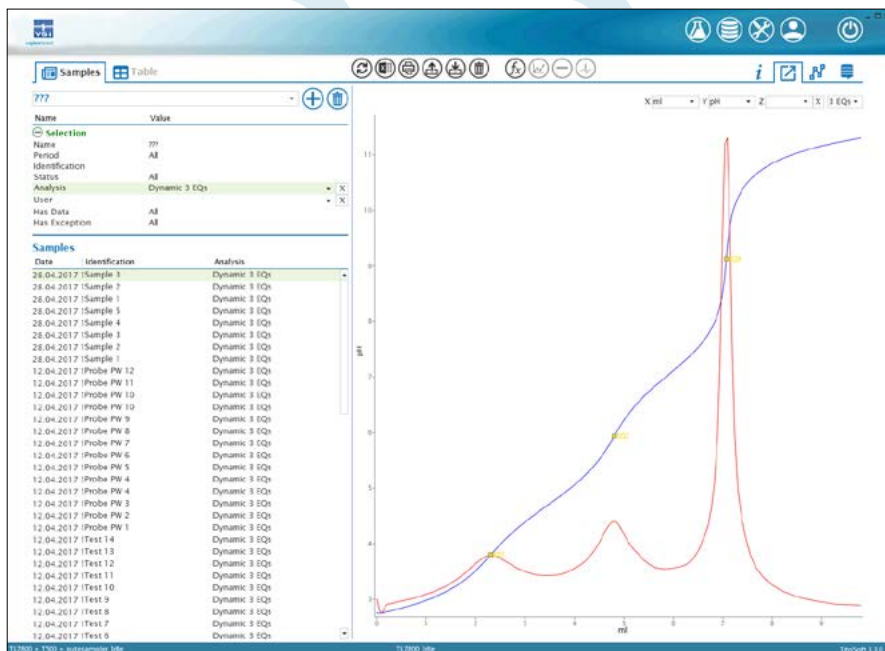
## Analysis, Your Method Center

This is where you set up and save your titration methods. Even complex methods can be installed with a few mouse clicks. Adjustment of the titration parameters is facilitated by the use of symbolic slide controls. Functions such as waiting time, IF loops, repetition, dosings and measurements, in addition to the titration parameters and calculation formulas, provide virtually unlimited options for method procedures.

## Database, Your Data Storage

Titration curves, results, measured values and used methods of all titrations are stored in the database. This data can be selected by sample name, date, user and method, and loaded in a few seconds.

You can display the information of the performed titrations as a graphic, result or measured value listing. Each stored titration can be subsequently optimized according to your needs. For example, you can add, save, and print subsequent calculations with the curve. A subsequent data export in ASCII or Excel format is possible at any time. In the TitriSoft 3.3, new filter functions have been added. Individual filters can be set by date, user, method, and the selected records are then listed in table form. These results can also be exported in Excel format, printed or saved as a PDF file.



Database Center - Sample view

## Worklists, Your Clearly Structured Workplace

›Worklists› is the place where you carry out your daily jobs, i.e. select methods, enter sample names and origin weighed-in quantities, start the work list and display (and print if desired) the results at the end of a titration. The work list shows the individual samples with the associated methods and their characteristics such as sample name, number, status, date, time, results and events and other freely configurable sample data, e.g. density.

During the process you can follow the titration under "curve" or directly via the worklist. You can, however, simply allow the samples to be processed in the background and use the PC for other tasks or start an additional titration with another configuration in parallel.

When working with the TW *alpha* plus and TW 7400 autosampler, you can adjust various settings such as skip empty items, rinse and waiting options.

Documentation, which is in accordance with GLP and ISO 9000 directives, can be produced in a number of different forms; tables, lists, curves or individual printouts with curves. In addition results can be saved in ASCII or CSV format, external documentation programs may be accessed and results transferred directly, e.g. into a LIMS.

Name	Value	Date	Identification	Analysis	Amount	EC1	EC2	EC3
Selection	777	28.04.2017 14:21	Sample 3	Dynamic 3 EQs	5	2,306	4,802	7,017
Name	777	28.04.2017 14:13	Sample 2	Dynamic 3 EQs	5	2,216	4,703	6,961
Period	All	28.04.2017 14:06	Sample 1	Dynamic 3 EQs	5	1,811	4,291	6,055
Identification	All	28.04.2017 11:52	Sample 5	Dynamic 3 EQs	5	2,251	4,681	6,866
Status	All	28.04.2017 11:45	Sample 4	Dynamic 3 EQs	5	2,248	4,691	6,881
Analysis	Dynamic 3 EQs	28.04.2017 11:38	Sample 2	Dynamic 3 EQs	5	n. def.	n. def.	n. def.
User	All	28.04.2017 11:37	Sample 2	Dynamic 3 EQs	5	4,979	n. def.	n. def.
Has Data	All	28.04.2017 11:34	Sample 1	Dynamic 3 EQs	5	3,85	n. def.	n. def.
Has Exception	All	12.04.2017 15:27	Probe PW 12	Dynamic 3 EQs		1,708	3,052	4,526
		12.04.2017 15:20	Probe PW 11	Dynamic 3 EQs		1,726	3,078	4,516
		12.04.2017 15:14	Probe PW 10	Dynamic 3 EQs		1,579	2,955	4,438
		12.04.2017 14:50	Probe PW 10	Dynamic 3 EQs		1,467	2,75	8,675
		12.04.2017 14:44	Probe PW 9	Dynamic 3 EQs		1,433	2,536	5,95
		12.04.2017 14:37	Probe PW 8	Dynamic 3 EQs		1,446	2,549	9,091
		12.04.2017 14:30	Probe PW 7	Dynamic 3 EQs		1,544	2,893	4,36
		12.04.2017 14:22	Probe PW 6	Dynamic 3 EQs		1,51	4,25	n. def.
		12.04.2017 11:44	Probe PW 5	Dynamic 3 EQs		1,544	2,847	4,257
		12.04.2017 11:37	Probe PW 4	Dynamic 3 EQs		1,155	2,643	n. def.
		12.04.2017 11:33	Probe PW 4	Dynamic 3 EQs				
		12.04.2017 11:10	Probe PW 3	Dynamic 3 EQs		1,289	2,567	4
		12.04.2017 11:04	Probe PW 2	Dynamic 3 EQs		1,536	4,259	n. def.
		12.04.2017 11:04	Probe PW 1	Dynamic 3 EQs		1,655	2,562	4,411
		12.04.2017 10:48	Test 14	Dynamic 3 EQs		0,052	1,121	15,1
		12.04.2017 10:44	Test 13	Dynamic 3 EQs		0,569	15,85	n. def.
		12.04.2017 10:40	Test 12	Dynamic 3 EQs		1,182	n. def.	n. def.
		12.04.2017 10:36	Test 11	Dynamic 3 EQs		1,029	n. def.	n. def.
		12.04.2017 10:32	Test 10	Dynamic 3 EQs		0,154	n. def.	n. def.
		12.04.2017 10:28	Test 9	Dynamic 3 EQs		0,254	n. def.	n. def.
		12.04.2017 10:24	Test 8	Dynamic 3 EQs		1,75	n. def.	n. def.
		12.04.2017 10:21	Test 7	Dynamic 3 EQs		1,818	1,175	16,3
		12.04.2017 10:17	Test 6	Dynamic 3 EQs		n. def.	n. def.	n. def.
		12.04.2017 10:13	Test 5	Dynamic 3 EQs		1,872	8,8	n. def.
		12.04.2017 10:08	Test 4	Dynamic 3 EQs		2,3	11,3	n. def.
		12.04.2017 10:07	Test 3	Dynamic 3 EQs		0,054	n. def.	n. def.
		12.04.2017 10:02	Test 2	Dynamic 3 EQs		0,235	1,852	n. def.
		12.04.2017 10:01	Test 1	Dynamic 3 EQs		n. def.	n. def.	n. def.
		12.04.2017 09:58	Test 4	Dynamic 3 EQs		n. def.	n. def.	n. def.
		12.04.2017 09:57	Test 3	Dynamic 3 EQs		n. def.	n. def.	n. def.
		12.04.2017 09:56	Test 2	Dynamic 3 EQs		n. def.	n. def.	n. def.
		12.04.2017 09:55	Test 1	Dynamic 3 EQs		n. def.	n. def.	n. def.
		12.04.2017 09:52	Test 1	Dynamic 3 EQs				
		11.04.2017 15:04	Test 22	Dynamic 3 EQs		0,627	n. def.	n. def.
		11.04.2017 14:59	Test 21	Dynamic 3 EQs		0,293	n. def.	n. def.
		11.04.2017 14:55	Test 20	Dynamic 3 EQs		0,949	n. def.	n. def.
		11.04.2017 14:51	Test 19	Dynamic 3 EQs		0,548	n. def.	n. def.
		11.04.2017 14:47	Test 18	Dynamic 3 EQs		0,292	n. def.	n. def.
		11.04.2017 14:43	Test 17	Dynamic 3 EQs		0,52	16,35	n. def.
		11.04.2017 14:36	Test 16	Dynamic 3 EQs		0,014	0,659	1,334

Database Center - Tab View

No	Status	Analysis	Identification	Amount	Date	Curve	Int. pH	EC1	EC2	EC3	NaOH 0.1 mol/l	Titer NaOH
1	Ready	Titer with KHPis	Titer NaOH	0,2347	28.04.2017		11,5188				0,0958	0,0958
2	Ready	Titer with KHPis	Titer NaOH	0,1668	28.04.2017		8,1917				0,0997	0,0997
3	Ready	Titer with KHPis	Titer NaOH	0,3311	28.04.2017		6,4458				0,0996	0,0996
4	Ready	Dynamic 3 EQs	Sample 1	3	28.04.2017		2,84	1,811	4,291	6,055		
5	Ready	Dynamic 3 EQs	Sample 2	3	28.04.2017		2,74	2,216	4,703	6,961		
6	Ready	Dynamic 3 EQs	Sample 3	3	28.04.2017		2,76	2,306	4,802	7,017		

Titration Center - Worklists

## 6.2 TitriSoft 3.3 P – Simply reliable

In this case, the "P" stands for "pharmaceutical". The TitriSoft 3.3 P meets all requirements of the FDA 21 CFR Part 11 regulation regarding "Electronic Records", "Electronic Signature" and "Audit Trail".

The Food and Drug Administration (FDA) 21 CFR Part 11 regulations describe how to deal with electronically stored data ("Electronic Records") and how to prepare electronic signatures ("Electronic Signature"). These regulations are binding for all companies offering medical, pharmaceutical or food products and services.

### System Requirements

The computer system requirements for TitriSoft 3.3 P are identical with those of the standard version.

## Comparison between TitriSoft 3.3 and 3.3 P

Functions	TitriSoft 3.3	TitriSoft 3.3 P
Electronic records	■	■
Electronic signatures	—	■
Audit trail	—	■
Controlled access	■	■
Copies of records	■	■
Straightforward procedure	■	■
All types of titrations	■	■
Comfortable worklists	■	■
Online titration curves	■	■
Clear documentation	■	■
Perfect titration control by PC	■	■
Parallel titration (with multiple configurations, also with a TL 7800 and a piston burette (please refer to page 55))	■	■

## Controlled Access

The controlled access guarantees that only authorized individuals have access to the software functions, according to your company's security policy and the FDA requirements.

TitriSoft 3.3 P has five different access levels: The "Operator" level only allows you to carry out routine titrations, whereas the "Advanced User" level is entitled to approve the methods. The highest level, the "Administrator" may set up the users and assign them user rights. The Administrator even has the permission to delete records, but only after a copy of the database has been generated. This is performed automatically.

TitriSoft Anwender		Name	vollständiger Name	Anwendertyp	Letzte Anmeldung	Status
Configuration	ad	admin	Administrator A	Administrator	15.05.2017 14:33	Active
Electrodes	Admin A	Admin A	Administrator A	Administrator	12.05.2017 14:07	Active
	Admin B	Admin B	Administrator B	Administrator	12.05.2017 14:07	Active
Chemicals	advuser	advuser	Test advanced user	Advanced user	04.11.2013 15:23	Active
Results	Amit	Amit M.	Advanced user	Advanced user		Locked
	Ian	Ian Smith	Operator	Operator		Locked
Globals	operator	Operator	Operator	Operator		Active
Sample data	Stefan	Stefan Klaus	User	User		Active
Tracer	testop	Test Operator	Operator	Operator	20.11.2012 16:40	Active
	Tim	Tim Ford	Advanced operator	Advanced operator		Active
Audit trail	user	Test user	User	User	08.06.2016 14:18	Active

User Administration

User Level	Operator	Advanced Operator	User	Advanced User	Administrator
Start worklists	■	■	■	■	■
Change worklist settings	—	—	■	■	■
Delete worklists	—	—	—	■	■
Data base, export results again / recalculating	—	■	■	■	■
Generate methods	—	—	■	■	■
Delete methods	—	—	■ 1), 2)	■ 1), 2)	■ 1), 2)
Global system configuration	—	—	—	■	■
System configuration, generate and delete users	—	—	—	—	■

1) A method may only be deleted if no titration / measurement has been carried out yet.

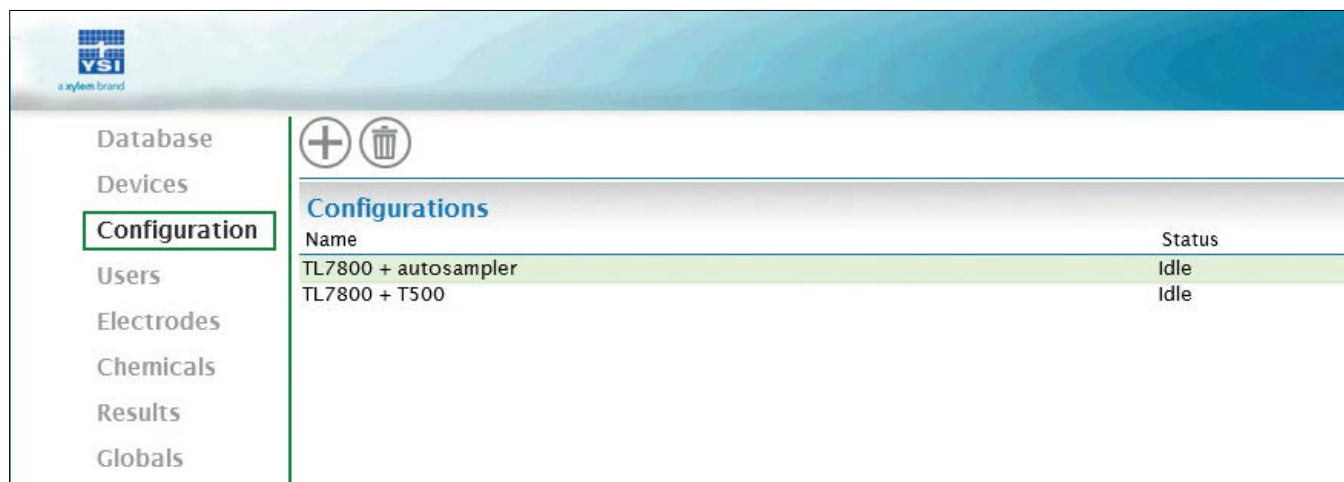
2) For Pharmaversion only: If a method or result has been released, it may not be deleted. The administrator may delete results. But a copy of the database is automatically created before the deletion process.

## 6.3 "Parallel" titration with TitroLine® 7800 and TitriSoft 3.3/3.3 P

The combination of the new TitriSoft 3.3 / 3.3 P, TitroLine® 7800 and a TITRONIC® 300 / 500 piston burette can be used to perform a so - called "parallel" titration. This means you only need one titrator and one piston burette to carry out two titrations simultaneously, in parallel.

Typical example:

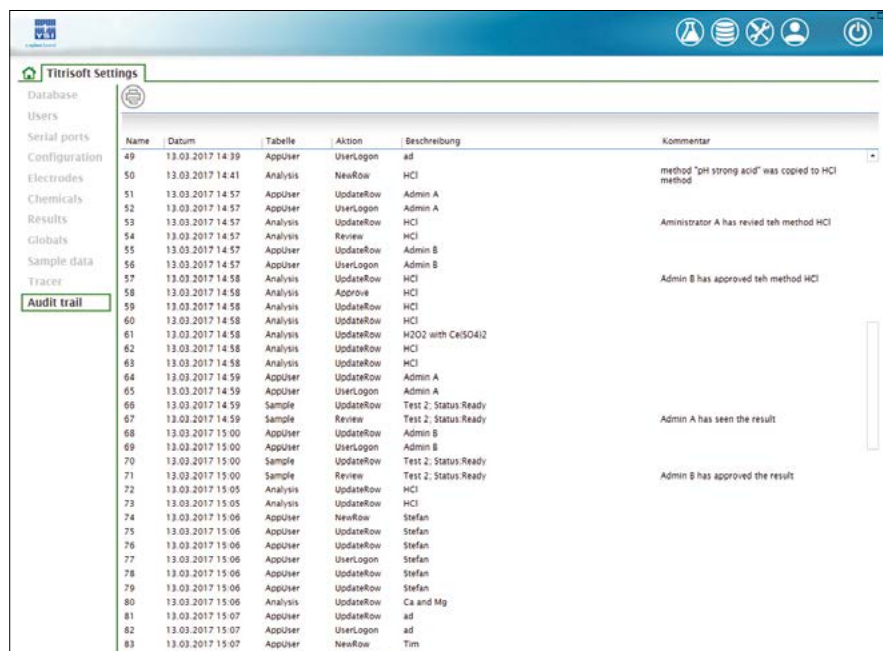
A TitroLine® 7800 and an autosampler are used to carry out titrations in a configuration of acid base. The pH electrode is connected to the measuring input A. At the same time, a titration of chloride is carried out with a second configuration. The silver electrode is connected to the input B. The titration is carried out with a TITRONIC® 500 piston burette.



Name	Status
TL7800 + autosampler	Idle
TL7800 + T500	Idle

Parallel Titration

## TitriSoft 3.3 P

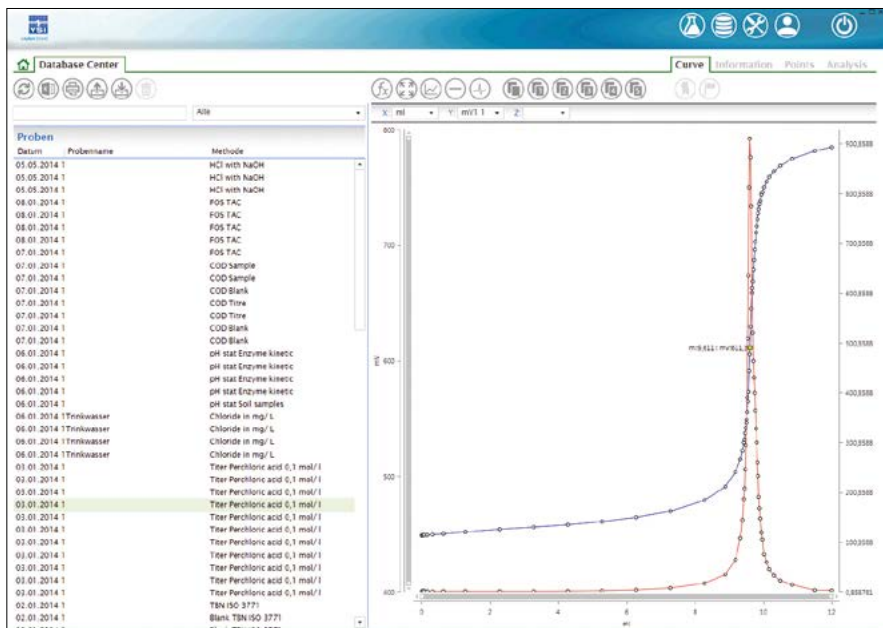


Name	Datum	Tabelle	Aktion	Beschreibung	Kommentar
49	13.03.2017 14:39	AppUser	UserLogin	ad	
50	13.03.2017 14:41	Analysis	NewRow	HCl	method "pH strong acid" was copied to HCl method
51	13.03.2017 14:57	AppUser	UpdateRow	Admin A	
52	13.03.2017 14:57	AppUser	UserLogin	Admin A	
53	13.03.2017 14:57	Analysis	UpdateRow	HCl	
54	13.03.2017 14:57	Analysis	Review	HCl	Administrator A has revised teh method HCl
55	13.03.2017 14:57	AppUser	UpdateRow	Admin B	
56	13.03.2017 14:57	AppUser	UserLogin	Admin B	
57	13.03.2017 14:58	Analysis	UpdateRow	HCl	Admin B has approved teh method HCl
58	13.03.2017 14:58	Analysis	Approve	HCl	
59	13.03.2017 14:58	Analysis	UpdateRow	HCl	
60	13.03.2017 14:58	Analysis	UpdateRow	HCl	
61	13.03.2017 14:58	Analysis	UpdateRow	H2O2 with CaISO4I2	
62	13.03.2017 14:58	Analysis	UpdateRow	HCl	
63	13.03.2017 14:58	Analysis	UpdateRow	HCl	
64	13.03.2017 14:59	AppUser	UpdateRow	Admin A	
65	13.03.2017 14:59	AppUser	UserLogin	Admin A	
66	13.03.2017 14:59	Sample	UpdateRow	Test 2; Status Ready	
67	13.03.2017 14:59	Sample	Review	Test 2; Status Ready	Admin A has seen the result
68	13.03.2017 15:00	AppUser	UpdateRow	Admin B	
69	13.03.2017 15:00	AppUser	UserLogin	Admin B	
70	13.03.2017 15:00	Sample	UpdateRow	Test 2; Status Ready	
71	13.03.2017 15:00	Sample	Review	Test 2; Status Ready	Admin B has approved the result
72	13.03.2017 15:05	Analysis	UpdateRow	HCl	
73	13.03.2017 15:05	Analysis	UpdateRow	HCl	
74	13.03.2017 15:06	AppUser	NewRow	Stefan	
75	13.03.2017 15:06	AppUser	UpdateRow	Stefan	
76	13.03.2017 15:06	AppUser	UpdateRow	Stefan	
77	13.03.2017 15:06	AppUser	UserLogin	Stefan	
78	13.03.2017 15:06	AppUser	UpdateRow	Stefan	
79	13.03.2017 15:06	AppUser	UpdateRow	Stefan	
80	13.03.2017 15:06	Analysis	UpdateRow	Ca and Mg	
81	13.03.2017 15:07	AppUser	UpdateRow	ad	
82	13.03.2017 15:07	AppUser	UserLogin	ad	
83	13.03.2017 15:07	AppUser	NewRow	Tim	

Audit Trail

### Audit Trail

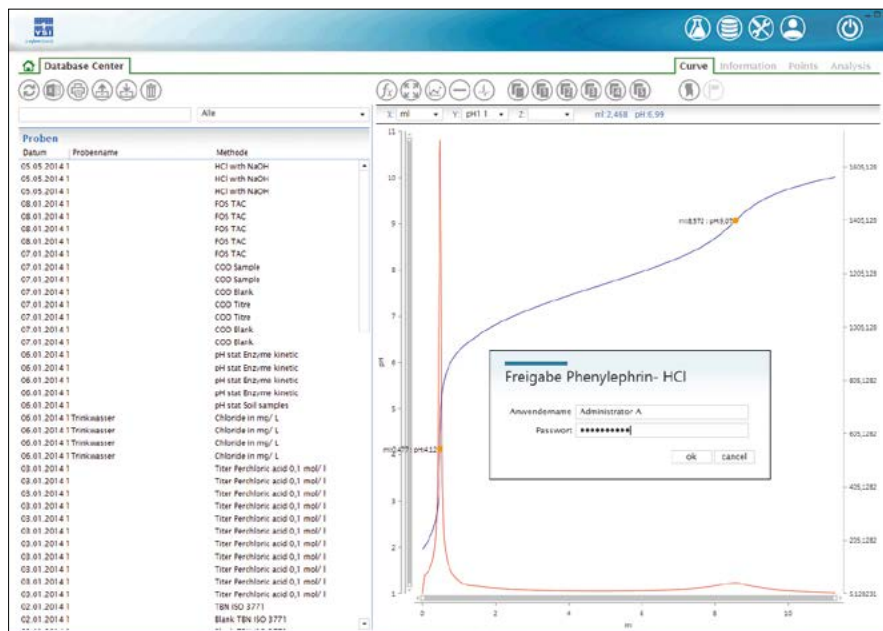
The 21 CFR Part 11 explains that creating methods, modifying passwords or saving results, generates an entry in the Audit Trail. TitriSoft 3.3 P automatically generates an entry in the Audit Trail table as soon as an access to the database has taken place. The local time and the GMT are automatically stored together with this entry in the Audit Trail. Each entry also asks for a comment. The Audit trail or parts of it can be printed out, or a "human" readable digital copy of it, e.g. a PDF file can be generated.



Electronic Records

### Electronic Signature

Digital analysis results have to be as reliable as classical, manually checked results with a handwritten signature. A digital signature, which is as safe as a handwritten one, can be placed to approve all electronic records. The approver has to enter the name and an additional password. The electronic signature is stored together with the signer's function, the reason of signing, and the date and time.



Electronic Signature

### Electronic Records

The 21 CFR Part 11 prescribes how to safeguard and store the generated results over time. Besides regularly making backup copies of the complete database, it is possible to generate readable digital copies of the results, methods, worklists, the Audit Trail, the user administration and the configuration(s). For that purpose, a PDF writer is already integrated in the software, eliminating the need for expensive third-party software for generating PDF files.

The database is password protected against unauthorized access.

Software

## 6.4 Ordering information TitriSoft 3.3 /3.3 P

Type No.	Order No.	Description
TZ 3071	285220717	TitriSoft 3.3 Titration software for all TitroLine® 7XXX titrators and TITRONIC® 300/500 piston burettes
TZ 3072	285220727	TitriSoft Titration software like Version 3.3, but 21 CFR, part 11 compliant version

# 7. Electrodes for titration

## Perfectly Matching Measurement Systems

### Laboratory Electrodes

Suitable for our versatile devices, we offer countless types of SI Analytics electrodes for almost every application. These electrodes are still produced by hand in order to ensure the best possible quality, a long shelf life, and precise measurement.



Example electrodes



# Content – Titration electrodes

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The correct electrode for the titration application is of crucial importance for the correctness and reproducibility of the results. To help you choose the right electrode, we have put together the appropriate electrodes for the most important applications.

Application	Electrode w.o. temp.-sensor	Electrode with integrated temp.-sensor
<b>Acid-base-titrations</b>		
Aqueous, general strong acid and bases	A 7780	A 7780 1M-DIN-ID
Aqueous, difficult applications	N 62, N 61	A 162-2M-DIN-ID
Kjeldahl	A 7780	A 7780 1M-DIN-ID
Alkalinity	N 62, N 61	A 162-2M-DIN-ID
Low ionic liquids	N 64	A 162-2M-DIN-ID
Small sample amounts	N 5900 A	A 157
Titration with autosampler (100–250 ml vessels)	N 65	A 162-2M-DIN-ID
Titration with autosampler (50 ml vessels, micro)	N 5900 A	—
<b>Non aqueous acid base-titrations</b>		
TAN (ASTM 664)	N 6480 eth, OptiLine 6	—
OH-No, NCO-No, FFA saponification No. ...	N 6480 eth	—
TBN (ISO 3771/ASTM 2896)	N 6480 eis, N 6480 eth, OptiLine 6	—
Epoxy value	N 6480 eis, N 6480 eth	—
Titration with perchloric acid/acetic acid	N 6480 eis, N 6480 eth, OptiLine 6	—
<b>Precipitation titrations</b>		
Halogenides (chloride, "salt")	AgCl 62, AgCl 62 RG	—
Halogenides, autosampler	AgCl 65, AgCl 62 RG	—
Pseudo halogenides (cyanide ...)	Ag 6280, Ag 62 RG	—
Surfactants	TEN 1100*	—
<b>Redox titrations</b>		
General, iodometric, permanganometric, cerimetric	Pt 62, Pt 6280, Pt 62 RG Pt 6280	—
Iodine number, peroxid number	Pt 61, Pt 62, Pt 62 RG	—
COD	Pt 61	—
Autosampler, general	Pt 6580	—
Autosampler, COD	Pt 5901	—
Dead stop (SO <sub>2</sub> bromine no. ...) general	Pt 1200	—
Dead stop (SO <sub>2</sub> bromine no. ...) autosampler, general and titration vessels	Pt 1400	—
Dead stop (SO <sub>2</sub> bromine no. ...) autosampler micro	KF 1100	—
KF titrations	KF 1100	—
<b>Complexometric titrations</b>		
Water hardness (Ca/Mg separated)	Ca 1100 PLH, OptiLine 6	—
Water hardness, total	Cu 1100 PLH, OptiLine 6	—
Copper, zinc, nickel, alumina ...	Cu 1100 PLH, OptiLine 6	—

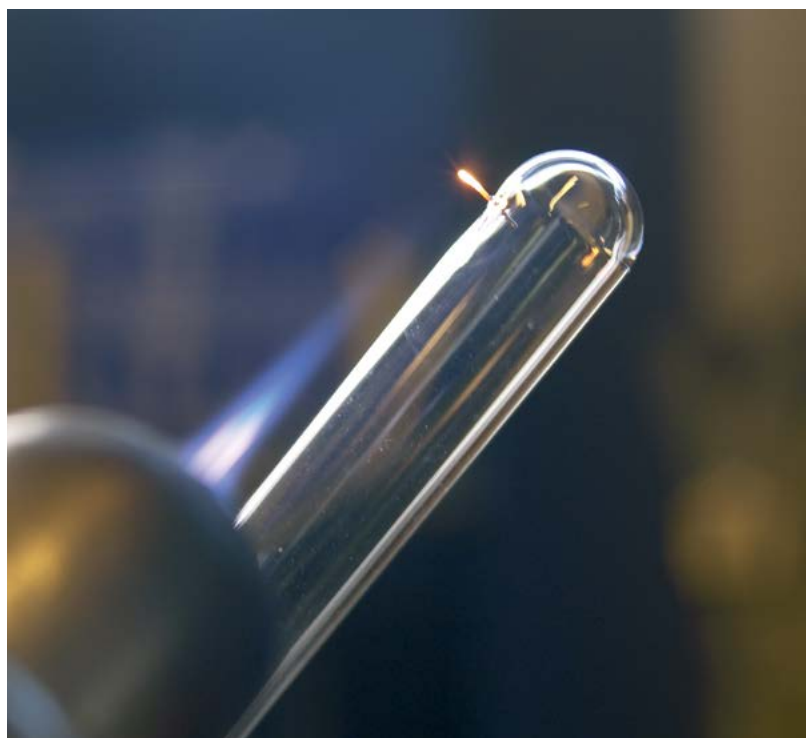
\* An applicable reference electrode is required: B 2920+ respectively. B 3520+

## 7.1 Our laboratory sensors - application orientated and perfectly matched

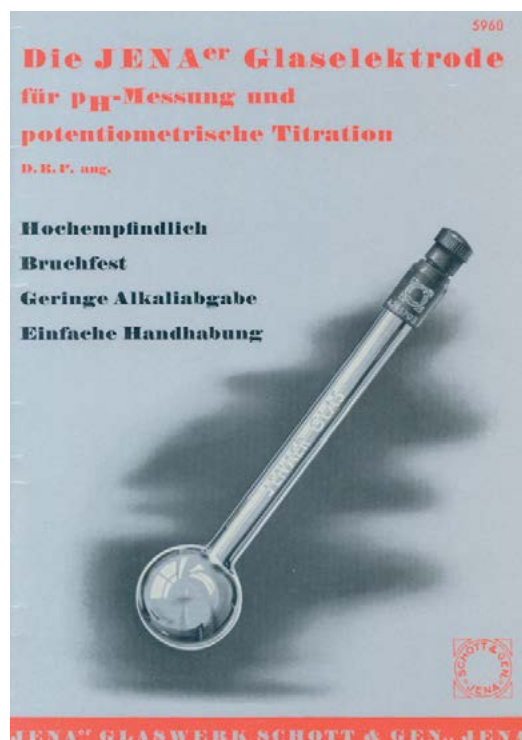
The standards for pH measurement are very high regarding precision, reproducibility, speed, handling and reliability. Every measurement is different. Different compositions, temperatures, conductivities and viscosities of samples and different measured conditions make for a million of different applications. Only application orientated and perfectly matched systems of electrodes, meters and buffer solutions can meet these standards. At SI Analytics we supply such systems.

The pH electrode is a very important part of the system as it comes in direct contact with the sample and provides the measurement signal. For more than 80 years our focus has been set on the electrode and we have dedicated ourselves to the development and manufacturing of glass electrodes. For a long time our electrodes have been used for the most demanding tasks in labs throughout the world where quality matters, and our customers benefit from this expertise. It all started with a patent on

pH electrodes - today it is a range of several hundred different sensors. Our electrode line includes three product families BlueLine, ScienceLine and TopLine to meet your applications. Whether for ultrapure water, jam, wine, cream or drinking water, SI Analytics offers the right electrode for every application.

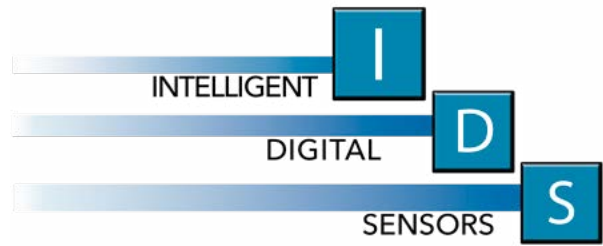


*Even today glass blowing talent is still indispensable.*



*Our first instruction booklet appeared in 1938. In those days the electrochemical pH measuring and the potentiometric titration still needed to be explained.*

# 7.2 IDS



## New features

SI Analytics' IDS: Intelligent, Digital Sensors technology for the standard parameters pH, conductivity and dissolved oxygen consists of two components, digital sensors and matching field or benchtop meters. This new processing of the measured values no longer takes place in the device, exclusively in the sensor so that every sensor has its own data base when connected.

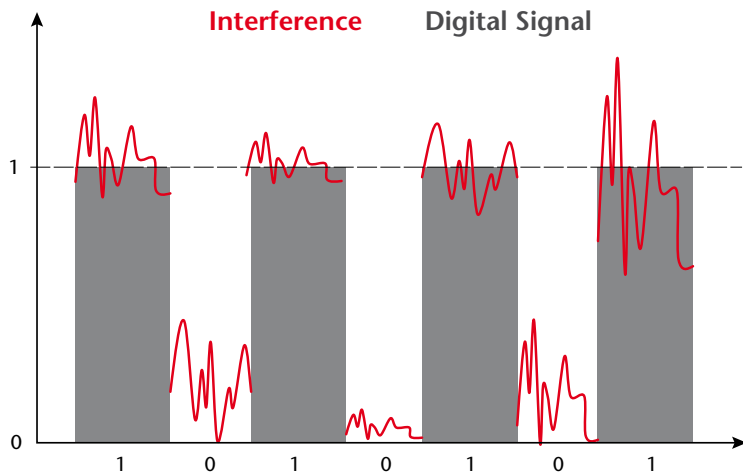
Built on the basic sensor of the BlueLine and ScienceLine series that have proven themselves tens of thousands of times over, the IDS sensors have added precision and reliability and cover almost any application.

### I intelligent:

IDS sensors are intelligent. They log into the device automatically, submit their name, serial number, calibration status and history as well as all parameters.

### D digital:

IDS sensors transform the sensitive measuring signals in the sensor head into digital signals and transmit them to the output device without interference and errors.



### S sensor:

IDS sensors are based on proven and continuously developed sensors by SI Analytics. They cover almost any lab application, like pH, conductivity or dissolved oxygen measurements.



# IDS sensors

## Unique.

IDS sensors combine proven measuring technology with new advantages. Based on established electrochemical SI Analytics sensors, but equipped with state-of-the-art measuring electronics IDS save the serial number and calibration data in the sensor. However, IDS sensors also process measuring signals directly, thus improving the data quality. This also allows a current evaluation of the sensor quality by means of the QSC (Quality Sensor Control) function.

- High-quality, highly developed sensor technology combined with state-of-the-art measuring electronics
- Saved serial number and calibration history - error-free and immediately ready for use
- Current evaluation of the sensor quality for IDS pH electrodes
- IDS conductivity measurement: Two sensors to cover all applications

### IDS sensors

- ▶ Higher accuracy than traditional analog sensors
- ▶ Chemically-resistant against environmental influences
- ▶ QSC takes the guess work out of determining the health of your sensor
- ▶ Effortless capture and storage of the latest calibration data
- ▶ Highest possible operator comfort and measuring precision

Benefits  
ID Sensors



Electrodes

## 7.3 ScienceLine electrodes

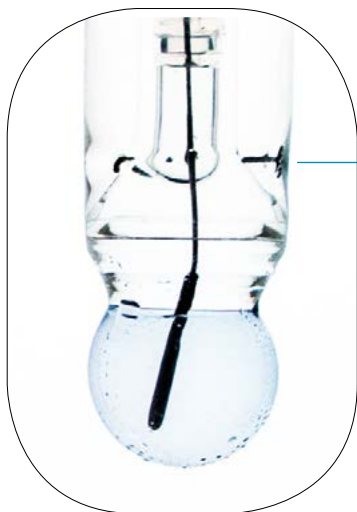
### The proven high-end laboratory electrodes

In research and development, manufacturing and quality control, our ScienceLine electrodes have become standard for the most demanding measurement tasks. Each electrode has an individual serial number and pH- and metal combination electrodes are supplied with a quality certificate, making documentation simple and better traceable.

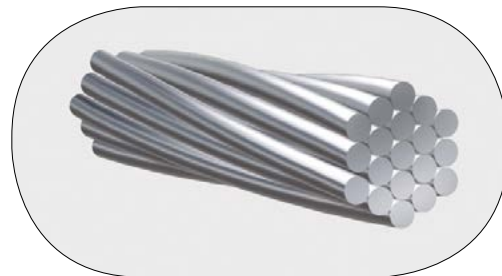
We have kept on improving the glass membrane shapes and types to make the electrodes even more robust, durable and easier to clean. Furthermore, they achieve stable measurement values even faster.

Our ScienceLine electrodes ensure high measurement accuracy and stability and long service life, but are highly adaptable to your measurement tasks. We can offer you a range of electrodes with unmatched versatility and quality.

*A perfect all-rounder for basically any application is the platinum diaphragm. Multiple of platinum wires are twisted and fused together. The outflow channels between the wires have constant dimensions. This provides, e.g. compared to the ceramic diaphragm, a pulsation-free discharge and therefore reliable measured values as well as even better self-cleaning.*



Platinum diaphragm



- ▶ Proven high-end electrodes for demanding measurement tasks
- ▶ Double junction Silamid® reference system for fast, stable acquisition of measured values and longer electrode life.
- ▶ Unmatched versatility. We offer a large selection of junctions, membrane glass types and shapes, shaft lengths and diameters, ground joints, plug connections and integrated temperature sensors for our pH electrodes.
- ▶ Each pH and metal combination electrode comes with its own individual serial number and quality certificate.
- ▶ Large selection of separate glass and reference electrodes, metal combination electrodes, conductivity sensors, ion selective electrodes and ammonia, sodium and oxygen sensors.

Benefits  
ScienceLine

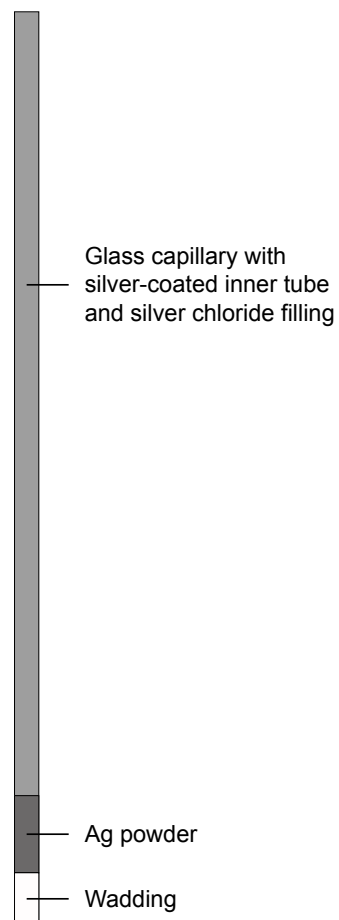


### Typical examples:

- pH electrodes with a length of up to 600 mm for measurements in very deep vessels
- The N 6003 electrode allows pH measurements even in NMR tubes or other small sample vessels. The A 157 is a micro electrode with an integrated temperature sensor with a 5 mm diameter.
- For more demanding media, choose from different junctions and membrane glasses such as the N 64 and the types A 164 for measurements in samples of low ionic strength. Both feature a ground joint junction, and the A 164 offers a temperature sensor.
- We also offer a wide selection of separate reference and glass electrodes.

The more stable display of the measured value with Science Line electrodes, as well as their longer life are due to their Silamid reference system. The ScienceLine employs a double junction design where the inner tube is coated with silver which provides for a very stable electrode. Hence, the stability of the potential is much higher.

### Silamid derivation



- ▶ The Silamid reference is a closed dissipating element in which a glass tube is coated with silver and filled with silver.
- ▶ Compared to a silver chlorinated silver wire, the potential setting area is significantly increased.
- ▶ The watt plug is an inner second diaphragm.
- ▶ Electrodes with a silamide reference therefore have an even longer lifetime compared to electrodes with Ag / AgCl wire as well as an even more stable and reliable measurement.

**Benefits  
Silamid**

# 7.3.1 ScienceLine pH combination electrodes

## pH combination electrodes with plug head and fixed cable

Reference system: Silamid®  
 Shaft material: Glass  
 Zero point: pH = 7.0 ± 0.3  
 Electrolyte: KCl 3 mol/l  
 (except  
 N 6250: KCl  
 4.2 mol/l,  
 A 7780 and  
 L 7780: gel  
 electrolyte,  
 L 8280:  
 Referid®  
 electrolyte)  
 Membrane shape: Sphere  
 pH range: 0 to 14  
 Connection cable  
 for plug head: e.g. L 1 A  
 (See also page  
 with connec-  
 tion cables)  
 fixed cable: 1 m long, with  
 plug A acc. to  
 DIN 19262 or  
 with BNC plug



N 61  
 N 52 A  
 N 52 BNC  
 N 61 eis  
 N 62  
 N 6180  
 N 6280

N 64  
 H 6480 eis  
 H 6480 eth  
 N 6480 eth 2 M  
 -DIN ID

N 65  
 H 65  
 N 6580

N 6980

A 7780

Order No.	Type No.	Length L [mm]	Ø [mm]	Junction	pH-glass	Temp. range [°C]	Connection	Remarks
285101260	A 7780	120	12	3 x ceramic	A	-5 to +80	plug head	gel electrolyte
285100494	N 52 A	120	12	platinum	A	-5 to +100	DIN plug <sup>2</sup>	
285105451	N 52 BNC	120	12	platinum	A	-5 to +100	BNC plug <sup>2</sup>	
285100001	N 61	170	12	platinum	A	-5 to +100	plug head	
285100018	N 6180	170	12	ceramic	A	-5 to +100	plug head	
285092661	N 61eis	170	12	3 x platinum	A	+10 to +40	plug head	electrolyte L 5014, Ag/AgCl ref.
285100034	N 62	120	12	platinum	A	-5 to +100	plug head	
285100042	N 6280	120	12	ceramic	A	-5 to +100	plug head	
285100059	N 64	170	12	ground joint	A	-5 to +100	plug head	
285092337	N 6480 eis	<sup>170</sup>	12	ground joint	A	+10 to +40	plug head	electrolyte L 5014, Ag/AgCl ref.
285092329	N 6480 eth	<sup>170</sup>	12	ground joint	A	0 to +40	plug head	electrolyte L 5014, Ag/AgCl ref.
285092340	N 6480 eth 2 M-DIN ID	<sup>170</sup>	12	ground joint	A	1 to +40	DIN plug	ID function
285100067	N 65	103 <sup>1</sup>	10	platinum	A	-5 to +100	plug head	standard taper NS 14.5
285102516	N 6580	103 <sup>1</sup>	10	ceramic	A	-5 to +100	plug head	standard taper NS 14.5
285101709	N 6980	103 <sup>1</sup>	10	ground joint	A	-5 to +100	plug head	standard taper NS 14.5

<sup>1</sup>) Length from upper end of standard taper

<sup>2</sup>) with 1 m fixed cable

## 7.3.2 ScienceLine pH combination electrodes with temperature sensor

### pH combination electrodes with temperature sensor

Reference system:	Silamid®
Shaft material:	Glass
Diameter:	12 mm
Zero point:	pH = 7.0 ± 0.3
Electrolyte:	KCl 3 mol/l
Temperature sensor:	Pt 1000
Membrane shape:	Sphere
pH range:	0 to 14
Connection cable: for SMEK-plug head:	e.g. LS 1 ANN (See also page with connec- tion cables)
fixed cable:	1 m long, with plug A acc. to DIN 19262 or with BNC plug, as well as plug for temperature sensor



N 1051 A  
N 1051 BNC  
N 1052 A  
N 1052 BNC

A 161 1M DIN ID  
A 161 1M BNC ID  
A 161 IDS  
A 162 2M DIN ID  
A 162 IDS

A 164 1M DIN ID  
A 164 1M BNC ID

A7780 NTC30  
A 7780 1M DIN ID  
A 7780 1M BNC ID  
A 7780 IDS

Order No.	Type No.	Length L [mm]	Junction	pH-glass	Temp.-range [°C]	Connection	Remarks
285130250	A 161 1M-BNC-ID	170	platinum	A	-5 to +100	BNC <sup>1</sup> - + 4-mm plug	ID function
285130240	A 161 1M-DIN-ID	170	platinum	A	-5 to +100	DIN <sup>1</sup> - + 4-mm plug	ID function
285100090	A 161 IDS	170	platinum	A	-5 to +100	IDS plug	IDS function
285130275	A 162 2M-DIN-ID	120	platinum	A	-5 to +100	DIN <sup>1</sup> - + 4-mm plug	DS function
285100120	A 162 IDS	120	platinum	A	-5 to +100	IDS plug	IDS function
285130290	A 164 1M-BNC-ID	170	ground joint	A	-5 to +100	BNC <sup>1</sup> - + 4-mm plug	ID function
285130280	A 164 1M-DIN-ID	170	ground joint	A	-5 to +100	DIN <sup>1</sup> - + 4-mm plug	ID function
285130210	A 7780 1M-BNC-ID	120	3 x ceramic	A	-5 to +80	BNC <sup>1</sup> + 4-mm plug	ID function
285130200	A 7780 1M-DIN-ID	120	3 x ceramic	A	-5 to +80	DIN <sup>1</sup> + 4-mm plug	ID function
285101080	A 7780 IDS	120	3 x ceramic	A	-5 to +80	IDS plug	IDS function
285130290	A 7780 NTC30 DIN-N	120	3 x ceramic	A	-5 to +80	DIN <sup>1</sup> + 4-mm plug	for portable Knick pH Meter
285100510	N 1051 A	170	platinum	A	-5 to +100	IDS plug	IDS function
285100500	N 1051 BNC	170	platinum	A	-5 to +100	BNC <sup>1</sup> + 4-mm plug	
1054512	N 1052 A	120	platinum	A	-5 to +100	DIN <sup>1</sup> + 4-mm plug	
285100380	N 1052 BNC	120	platinum	A	-5 to +100	BNC <sup>1</sup> + 4-mm plug	

<sup>1)</sup> with 1 m fixed cable

## 7.3.3 ScienceLine micro combination electrodes

### pH combination electrodes with temperature sensor

Reference system:	Silamid®
Shaft material:	Glass
Diameter:	12 mm
Zero point:	pH = 7.0 ± 0.3
Electrolyte:	KCl 3 mol/l
Temperature sensor:	Pt 1000
Membrane shape:	Sphere
pH range:	0 to 14
Connection cable: for SMEK-plug head:	e.g. LS 1 ANN (See also page with connec- tion cables)
fixed cable:	1 m long, with plug A acc. to DIN 19262 or with BNC plug, as well as plug for temperature sensor



A 157 1M BNC ID  
A 157 1M DIN ID  
A 157 IDS

N 5900 A  
N 5901  
N 5904

Order No.	Type No.	Length L [mm]	Ø [mm]	Junction	pH- glass	Membrane shape	Temp.- range [°C]	Range [pH]	Connection	Remarks
<b>Micro</b>										
285100080	A 157 IDS	70/130	12/5	platinum	A	cylindrical	-5 to +100	0 to 14	IDS plug	IDS function
285130160	A 157 1M-DIN-ID <sup>1</sup>	70/130	12/5	platinum	A	cylindrical	-5 to +100	0 to 14	DIN plug <sup>3</sup>	ID function
285130170	A 157 1M-BNC-ID <sup>1</sup>	70/130	12/5	platinum	A	cylindrical	-5 to +100	0 to 14	BNC plug <sup>3</sup>	ID function
285105135	N 5900 A	96 <sup>2</sup>	5	platinum	A	sphere	-5 to +100	0 to 14	DIN plug <sup>3</sup>	Ag/AgCl ref.
285105846	N 5901	160 <sup>2</sup>	6	platinum	A	sphere	-5 to +100	0 to 14	plug head	Ag/AgCl ref.
285105879	N 5904	200 <sup>2</sup>	6	platinum	A	sphere	-5 to +100	0 to 14	plug head	Ag/AgCl ref.

<sup>1)</sup> with integrated temperature sensor Pt 1000

<sup>2)</sup> Length from upper end of standard taper (Standard taper NS 7.5)

<sup>3)</sup> with 1 m fixed cable

# 7.3.4 ScienceLine metal combination electrodes

**Metal combination electrodes with silver/silver chloride reference system, plug head and connection cable**

- Temperature range: -5 to +100 °C  
(except Pt 6140: +10 to +40 °C)
- Reference system: Silamid®
- Shaft material: Glass
- Electrolyte: KCl 3 mol/l  
(See also remarks)
- Connection cable: e.g. L 1 A  
for plug head: (See also page with connection cables)
- fixed cable: 1 m long, with plug A acc. to DIN 19262 or with BNC plug



**Metal-reference electrodes with pH glass membrane reference system and plug head for titrations**

- Temperature range: -5 to +100 °C
- Reference system: pH glass membrane Type A
- Shaft material: Glass
- Length: 120 mm
- Diameter: 12 mm
- Connection cable for plug head: z.B. L 1 A  
(please refer to the page "connection cables")

- |   |   |                    |   |         |                                     |
|---|---|--------------------|---|---------|-------------------------------------|
| AgCl 62<br>AgCl 6280<br>AgCl 65<br>Ag 42 A<br>Ag 6180<br>Ag 62 IDS<br>Ag 6280<br>Ag 6580<br>Au 6280 | Pt 61<br>Pt 6180<br>Pt 62<br>Pt 6280<br>Pt 6580 | Pt 6880<br>Pt 6980 | Pt 62 RG<br>Ag 62 RG<br>AgCl 62 RG<br>AgS 62 RG<br>Pt 62 RG IDS | Pt 8280 | Pt 5900 A<br>Pt 5900 BNC<br>Pt 5901 |
|---|---|--------------------|---|---------|-------------------------------------|

Order No.	Type No.	Length L [mm]	Junction	Ø [mm]	Sensor Metal, shape	Connection	Remarks
285102208	Ag 6180	170	ceramic	12	Ag, cap, 5 mm Ø	plug head	electrolyte L 2114, Ag/AgCl ref.
285102150	Ag 62 IDS	120	platinum	12	Ag, cap, 5 mm Ø	plug head	IDS
285102090	Ag 62 RG	120	-	12	Pt bearing - silver coated,		
285102343	Ag 6280	<sup>120</sup>	ceramic	12	Ag, cap, 5 mm Ø	plug head	electrolyte L 2114, Ag/AgCl ref.
285102216	Ag 6580	1031	ceramic	10	Ag, cap, 5 mm Ø	plug head	electrolyte L 2114, Ag/AgCl ref.
285102100	AgCl 62 RG	120	-	12	Pt-bearing - silver coated, chlorinated, ring, 6 mm Ø	plug head	
285102413	AgCl 62 <sup>3</sup>	<sup>120</sup>	platinum	12	Ag, cap, 5 mm Ø	plug head	electrolyte L 2114, Ag/AgCl ref.
285102351	AgCl 6280 <sup>3</sup>	120	ceramic	12	Ag, cap, 5 mm Ø	plug head	electrolyte L 2114, Ag/AgCl ref.
1061051	AgCl 65 <sup>3</sup>	1031	platinum	12	Ag, cap, 5 mm Ø	plug head	electrolyte L 2114, Ag/AgCl ref.
285102110	AgS 62 RG	120	-	12	Pt bearing - silver coated, sulfidized, ring, 6 mm Ø	plug head	
285102121	Au 6280	<sup>120</sup>	ceramic	12	Au, pole, 2 mm Ø	plug head	
285105192	Pt 5900 A	<sup>962</sup>	platinum	5	Pt, pole, 1 mm Ø	DIN plug <sup>4</sup>	Ag/AgCl ref.
285105702	Pt 5900 BNC	<sup>962</sup>	platinum	5	Pt, pole, 1 mm Ø	BNC plug <sup>4</sup>	Ag/AgCl ref.
285105065	Pt 5901	1602	platinum	5	Pt, pole, 1 mm Ø	plug head	
285102002	Pt 61	170	platinum	12	Pt, pole, 1 mm Ø	plug head	
285102232	Pt 6180	170	ceramic	12	Pt, pole, 1 mm Ø	plug head	
285102019	Pt 62	120	platinum	12	Pt, pole, 1 mm Ø	plug head	
285102070	Pt 62 RG	120	-	12	Pt, ring, 6 mm Ø	plug head	
285102140	Pt 62 RG IDS	<sup>120</sup>	-	12	Pt, ring, 6 mm Ø	plug head	IDS
285102249	Pt 6280	120	ceramic	12	Pt, pole, 1 mm Ø	plug head	
285102257	Pt 6580	1031	ceramic	10	Pt, pole, 1 mm Ø	plug head	
285100075	Pt 6880	120	ceramic	12	Pt, ring, 6 mm Ø	plug head	
285102265	Pt 6980	170	ceramic	12	Pt, ring, 6 mm Ø	plug head	
285102281	Pt 8280	120	KPG®	12	Pt, round, 6 mm Ø	plug head	electrolyte Referid®
285102110	AgS 62 RG	120	-	12	Pt bearing - silver coated, sulfidized, ring, 6 mm Ø	plug head	
285102070	Pt 62 RG	120	-	12	Pt, ring, 6 mm Ø	plug head	

<sup>1)</sup> Length from upper end of standard taper; standard taper NS 14.5

<sup>2)</sup> Length from upper end of standard taper; standard taper NS 7.5

<sup>3)</sup> Sensor coated with AgCl

<sup>4)</sup> with 1 m fixed cable

# 7.3.5 ScienceLine single electrodes: pH glass and metal electrodes

## ScienceLine single electrodes

### pH glass electrodes

Reference system: Silamid®  
Shaft material: Glass, 12 mm Ø  
Zero point: pH = 7.0 ± 0.3  
Membrane shape: Sphere  
Connection cable: e.g. L 1 A

### Metal electrodes

Shaft material: Glass, 12 mm Ø  
(See remarks)



A 1180  
H 1180

Ag 1100

KF 1100

Pt 1400  
Pt 1200

Pt 1800

Order No.	Type No.	Length L [mm]	pH Glass	Range [pH]	Temp.- range [°C]	Remarks
1057997	A 1180	120	H	0 to 14	0 to +80	plug head
285103212	H 1180	120	H	0 to 14	10 to +100	plug head

Order No.	Type No.	Length L [mm]	Sensor Metal	Sensor shape	Temp. range [°C]	Remarks
285103607	Ag 1100	120	Ag	cap, 4 mm Ø	-5 to +100	plug head, cable e.g. L 1 A
285102030	KF 1100	96 <sup>1</sup>	Pt <sup>2</sup>	2 pole, 1 mm Ø	-30 to +135	shaft 5 mm Ø, standard taper NS 7.5, fixed cable, 2 x 4-mm plug
285103512	Pt 1200	120	Pt <sup>2</sup>	2 pole, 1 mm Ø	-30 to +135	plug head, cable e.g. L 1 NN
285103537	Pt 1400	103 <sup>1</sup>	Pt <sup>2</sup>	2 pole, 1 mm Ø	-30 to +135	shaft 10 mm Ø, standard taper NS 14.5, cable e.g. L 1 NN
285103553	Pt 1800	120	Pt	ring, 6 mm Ø	-30 to +135	plug head, cable e.g. L 1 A

<sup>1</sup>) Length from upper end of standard taper  
<sup>2</sup>) Double platinum electrode

## 7.3.6 ScienceLine single electrodes: reference electrodes

### Reference electrodes

Shaft material: Glass

Electrolyte depending on reference system:

Ag/AgCl: KCl 3 mol/l,  
e.g. L 300

Calomel: KCl 4.2 mol/l,  
e.g. L 420

Hg/Hg<sub>2</sub>SO<sub>4</sub>: K<sub>2</sub>SO<sub>4</sub> 0.6  
mol/l,  
e.g. L 1254

pH range: 0 to 14

Connection cable: e.g. L 1 N



Order No.	Type No.	Length L [mm]	Ø [mm]	Temp. range [°C]	Junction	Reference system	Remarks
1069994	B 2220+	120	12	-5 to +100	platinum	Ag/AgCl	double electrolyte system
1070028	B 2420+	120	12	-5 to +100	ground joint	Ag/AgCl	
1070044	B 2820+	120	12	-5 to +100	ceramic	Ag/AgCl	
1070046	B 2920+	120	12	-5 to +100	platinum	Ag/AgCl	
1070070	B 3420+	103 <sup>1</sup>	10	-5 to +100	ceramic	Ag/AgCl	standard taper NS 14.5
1070073	B 3520+	103 <sup>1</sup>	10	-5 to +100	platinum	Ag/AgCl	standard taper NS 14.5
1070074	B 3610+	103 <sup>1</sup>	10	+15 to +40	ceramic	Hg/Hg <sub>2</sub> SO <sub>4</sub>	standard taper NS 14.5
1070075	B 3920+	103 <sup>1</sup>	10	-5 to +100	ground joint	Ag/AgCl	double electrolyte system, standard taper NS 14.5

<sup>1)</sup> Length from upper end of standard taper

# 7.3.7 ScienceLine conductivity cells with cable

Conductivity measuring cells  
with fixed cable and 8-pole plug

Temperature sensor: NTC 30 k $\Omega$



LF 313 T IDS

LF 413 T IDS  
LF 413 T3MIDS

LF 413T 3M Fork IDS

Order No.	Type No.	Length L [mm]	Ø [mm]	Sensor	Cell const. ~ [cm <sup>-1</sup> ]	Temp. range [°C]	Meas. range <sup>1</sup> [µS/cm]..[mS/cm]	Remarks
285202430	LF 313 T IDS	120	12	Stainless steel	0.1	-5 to +100	0 to 0.2	Ultrapure water conductivity cell with flow-through vessel, stainless steel shaft, cable 1.5 m, IDS function
285202410	LF 413 T-IDS	120	15.3	4 x Graphite	0.475	-5 to +80	1 to 2,000	Plastic shaft, 1.5 m cable, IDS function
285202420	LF 435 T 3M IDS	120	15.3	4 x Graphite	0.475	-5 to +80	1 to 2000	Plastic shaft, 3 m cable, IDS function
285106290	LF 413 T 3M FORK IDS	120	15.3	4 x Graphite	0.47	-5 to +80	1 to 2000	Plastic shaft, 3 m cable, IDS function

<sup>1)</sup> Outside the recommended ranges measuring errors > 10% can occur with these conductivity measuring cells.

# 7.3.8 ScienceLine sensors for ammonia, sodium, oxygen

## Ammonia combination electrode with plug head

Shaft material: Plastic, 12 mm Ø  
 Connection cable: e.g. L 1 A

## Sodium combination electrode with plug head

Reference system: Silamid®  
 Shaft material: Glass, 12 mm Ø  
 Zero point: pNa = 2.0  
 Membrane shape: Sphere  
 Connection cable: e.g. L 1 A

## ISE measuring cells

Shaft material: Plastic  
 Length: 120 mm  
 Fixed cable: 1 m long, with DIN plug

## ISE combination electrodes with plug head

Shaft material: Plastic  
 Length: 120 mm



NH 1100

Na 61

TEN 1100 PLH

Cu 1100 PLH  
 Ca 1100 PLH  
 F 1100 PLH  
 PB1100 PLH

F 60  
 Cl 60  
 NO 60  
 K 60  
 CA 60  
 CN 60  
 AG-S 60  
 I 60  
 BR 60  
 CU 60  
 PB 60

# and ion-selective indicator electrodes

Order No.	Type No.	Length L [mm]	Temp. range [°C]	Meas. range [mg/l]	Remarks
285102808	NH 1100	120	0 to +50	0.1 to 1,000	membrane module replaceable

Order No.	Type No.	Length L [mm]	Junction	Membrane Glass	Temp. range [°C]	Meas. range [pNa]	Remarks
285100026	Na 61	170	platinum	Na	-10 to +80	0 to 6	electrolyte KCl 3 mol/l, aqueous solution NaCl 0.1 mol/l

Order No.	Type No.	Parameter	Temp. range [°C]	pH-range	Measuring range [mg/l]
285216268	Ca 1100 PLH	Calcium	0 to +40	2.5 to 11	0.02 to 40,000
285216273	Cu 1100 PLH	Copper	0 to +80	2 to 6	0.0006 to 6,400
285216295	F 1100 PLH	Fluoride	0 to +80	5 to 7	0.02 to saturated
285216287	Pb 1100 PLH	Lead	0 to +80	4 to 7	0.1 to 20,000
285096980	TEN 1100 PLH	Lead	0 to +80	2 to 11	

Order No.	Type No.	Parameter	Temp. range [°C]	pH-range	Measuring range [mg/l]
285130400	AG-S 60	Sulfide/silver	0 to +80	2 to 12	0.003 to 32,000/ 0.1 to 108,000
285130420	BR 60	Bromide	0 to +80	1 to 12	0.4 to 79,000
285130380	CA 60	Calcium	0 to +40	2.5 to 11	0.02 to 40,000
285130350	Cl 60	Chloride	0 to +80	2 to 12	2 to 35,000
285130390	CN 60	Cyanide	0 to +80	0 to 14	0.2 to 260
285130430	CU 60	Copper	0 to +80	2 to 6	0.0006 to 6400
285130340	F 60	Fluoride	0 to +80	5 to 7	0.02 to saturated
285130410	I 60	Iodide	0 to +80	0 to 14	0.006 to 127,000
285130370	K 60	Potassium	0 to +40	2 to 12	0.04 to 39,000
285130360	NO 60	Nitrate	0 to +40	2.5 to 11	0.4 to 62,000
285130440	PB 60	Lead	0 to +80	4 to 7	0.2 to 20,000

<sup>1)</sup> Other cable lengths available on request

# 7.4 Resistance thermometers

Resistance thermometers with 1 m fixed cable

Resistance thermometer with coaxial plug head



W 5780 NN



W 5790 NN  
W 5790 PP  
W 5791 NN



W 5980 NN



W 2180-KOAX

### Resistance thermometers with SMEK plug head

#### Resistance thermometers with 1 m fixed cable

Order No.	Type No.	Length L [mm]	Ø [mm]	Sensor	Temp. range [°C]	Shaft material	Connection plug
285105221	W 5780 NN	120	6	Pt 1000	-30 to +135	glass	2 x 4 mm Ø
285105254	W 5790 NN	120	4	Pt 1000	-30 to +135	stainless steel	2 x 4 mm Ø
285105776	W 5790 PP	120	4	Pt 1000	-30 to +135	stainless steel	2 x 4 mm Ø
285105262	W 5791 NN	170	4	Pt 1000	-30 to +135	stainless steel	2 x 4 mm Ø
285105287	W 5980 NN	96 <sup>1</sup>	5 NS 7.5	Pt 1000	-30 to +135	glass	2 x 4 mm Ø

#### Resistance thermometer with coaxial plug head

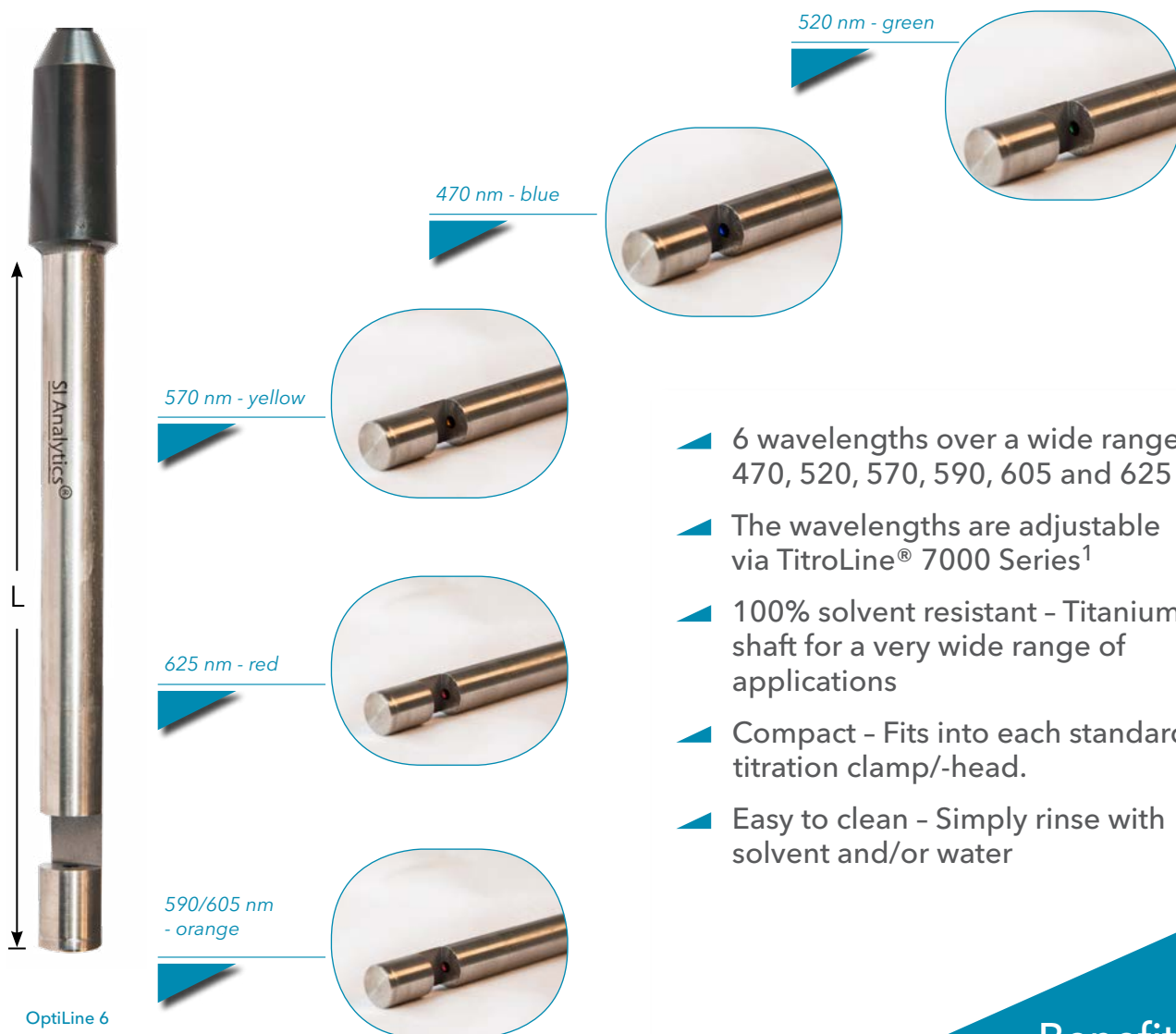
Order No.	Type No.	Length L [mm]	Ø [mm]	Sensor	Temp. range [°C]	Shaft material
285119030	W 2180-KOAX	120	12	Pt 1000	-30 to +135	glass

<sup>1)</sup> length from upper end of standard taper

# 7.5 OptiLine 6 for photometric titrations

Many titration applications and methods, e.g. N Ph. Eur. or USP prescribe the use of an indicator for the titration end point. There are also methods that explicitly require the use of a photometric sensor. The OptiLine 6 is a new photometric sensor that can be used like any other sensor. Thanks to the additional analog BNC / DIN connection, it can be connected to any titrator or even a pH meter with an appropriate measuring input. The power supply is included in the USB hub, which is in the scope of delivery...

Order No.	Type No.	Length L [mm]	Measuring range [mV]	Remarks
285221300	OptiLine 6	132	0 ... 2,000	Adjustable wavelengths

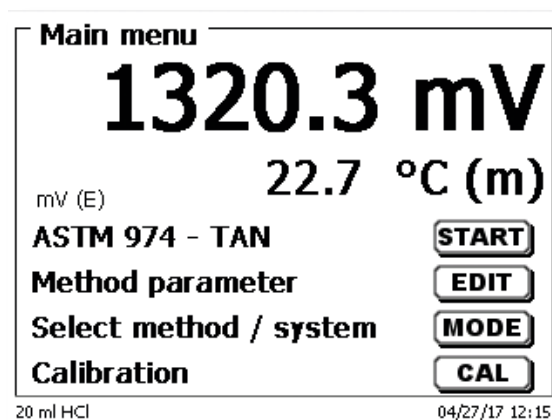
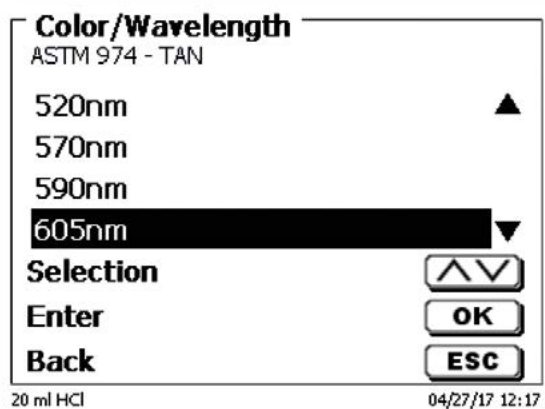


- ▶ 6 wavelengths over a wide range: 470, 520, 570, 590, 605 and 625
- ▶ The wavelengths are adjustable via TitroLine® 7000 Series<sup>1</sup>
- ▶ 100% solvent resistant - Titanium shaft for a very wide range of applications
- ▶ Compact - Fits into each standard titration clamp/-head.
- ▶ Easy to clean - Simply rinse with solvent and/or water

Benefits  
*OptiLine*

1) When using the analog BNC / DIN connector, the wavelengths are set with a software tool via PC.

The OptiLine 6 connects to the TitroLine® 7000, 7750 and 7800 via the USB connector and is detected as a digital sensor. This allows the setting of the wavelengths and other parameters such as the intensity via the titrator or the TitrISOFT software within the titration method.



### Typical applications for the OptiLine 6:

- ▶ Titrations according to Ph. Eur. and USP, which require the use of an indicator
- ▶ Titration of chondroitin sulfate-sodium according to Ph. Eur. and USP
- ▶ Determination of the carboxyl end groups in PET (non-aqueous titration)
- ▶ TAN/TBN according to ASTM D974 (non-aqueous titration)
- ▶ Titration of sulfate (indicator Thorin)
- ▶ Determination of Ca/Mg and total hardness, as well as all other complexometric titrations

### Specifications OptiLine 6

Shaft diameter	12 mm
Shaft length:	132 mm
Minimum immersion depth:	25 mm
Shaft material:	Titanium
Cable:	fixed, 2 m
Connections:	USB-plug A, BNC-plug with BNC-DIN-adapter
Power supply:	via USB
Measuring range:	0 - 2000 mV
Temperature range:	0 - 50 °C
pH-range:	0 - 14
Adjustable wavelength (nm):	470, 520, 570, 590, 605 and 625

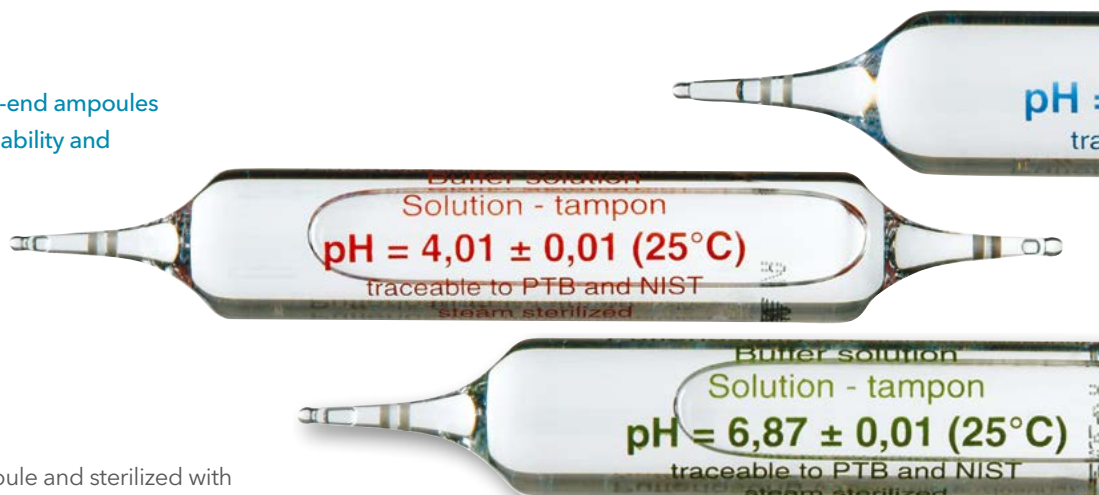
# 7.6 Solutions

Buffer solutions in the unique double-end ampoules offer a particularly high degree of reliability and measuring accuracy.

The exactness of the pH measurement is mainly dependent on the accuracy of calibration, which is highly dependent on the reliability of the buffer.

Hermetically sealed in the glass ampoule and sterilized with hot steam, just like pharmaceutical products, the buffer solutions are free of preservation agent and have an extremely long shelf life, guaranteeing continuously error-free characteristics.

The ampoules can be easily opened at the breaking point. Tools are not required. Since refilling is not possible, you are always ensured of optimum calibration reliability.



## Standard buffer solutions according to DIN 19 266 Hot steam sterilized for longer stability, no preservation agents used.

Order No.	Type No.	pH value at 25 °C	Contents
285137977	L 4791	1.68	60 FIOLAX® ampoules à 20 ml*, with manufacturer's certificate
285138246	L 4794	4.01	60 FIOLAX® ampoules à 20 ml*, with manufacturer's certificate
285138254	L 4796	6.87	60 FIOLAX® ampoules à 20 ml*, with manufacturer's certificate
285138262	L 4799	9.18	60 FIOLAX® ampoules à 20 ml*, with manufacturer's certificate
285138402	L 4790	4.01 / 6.87	2 x 30 FIOLAX® ampoules à 20 ml*, with manufacturer's certificate
285137985	L 4797	1.68 / 6.87 / 9.18	3 x 20 FIOLAX® ampoules à 20 ml*, with manufacturer's certificate
285138238	L 4798	4.01 / 6.87 / 9.18	3 x 20 FIOLAX® ampoules à 20 ml*, with manufacturer's certificate
285138279	L 4893 / Set	4.01 / 6.87	2 x 9 FIOLAX® ampoules à 20 ml*, with manufacturer's certificate, with electrolyte solution L 3008

Order No.	Type No.	pH value at 25 °C	Contents
285137841	L 168	1.68	1,000 ml in DURAN® glass bottle, with manufacturer's certificate
285137677	L 1684	1.68	250 ml in DURAN® glass bottle, with manufacturer's certificate
285138098	L 401	4.01	1,000 ml in DURAN® glass bottle, with manufacturer's certificate
285138008	L 4014	4.01	250 ml in DURAN® glass bottle, with manufacturer's certificate
285138102	L 687	6.87	1,000 ml in DURAN® glass bottle, with manufacturer's certificate
285138016	L 6874	6.87	250 ml in DURAN® glass bottle, with manufacturer's certificate
285138119	L 918	9.18	1,000 ml in DURAN® glass bottle, with manufacturer's certificate
285138024	L 9184	9.18	250 ml in DURAN® glass bottle, with manufacturer's certificate

\* 20 ml volume = ~17 ml content



- ▲ Highest measurement reliability
- ▲ Extremely long shelf life
- ▲ No preservatives
- ▲ Maximize calibration reliability

Benefits  
Ampoules

**Technical buffer solutions**  
Hot steam sterilized for longer stability, no preservatives used.

Order No.	Type No.	pH value at 25 °C	Contents
285138213	L 4694	4.00	60 FIOLAX® ampoules à 20 ml*, with manufacturer's certificate
285138221	L 4697	7.00	60 FIOLAX® ampoules à 20 ml*, with manufacturer's certificate
285138205	L 4691	10.01	60 FIOLAX® ampoules à 20 ml*, with manufacturer's certificate
285138398	L 4690	4.00/7.00	2 x 30 FIOLAX® ampoules à 20 ml*, with manufacturer's certificate
285138192	L 4698	4.00/7.00/10.01	3 x 20 FIOLAX® ampoules à 20 ml*, with manufacturer's certificate
285138632	L 4895/Set	4.00/7.00	2 x 9 FIOLAX® ampoules à 20 ml*, with manufacturer's certificate, with electrolyte solution L 3008,

Order No.	Type No.	pH value at 25 °C	Contents
285138727	L 400	4.00	1,000 ml in DURAN® glass bottle, with manufacturer's certificate
285138032	L 4004	4.00	250 ml in DURAN® glass bottle, with manufacturer's certificate
285138735	L 700	7.00	1,000 ml in DURAN® glass bottle, with manufacturer's certificate
285138049	L 7004	7.00	250 ml in DURAN® glass bottle, with manufacturer's certificate
285138719	L 100	10.01	1,000 ml in DURAN® glass bottle, with manufacturer's certificate
285138057	L 1004	10.01	250 ml in DURAN® glass bottle, with manufacturer's certificate

\* 20 ml volume = ~17 ml content

# Solutions

## Color-coded technical buffer solutions in plastic bottles

Order No.	Type No.	pH value at 25 °C	Contents
285139156	LC 4004 K	4.01	250 ml in PE bottle
285139189	LC 7004 K	7.00	250 ml in PE bottle
285139218	LC 1004 K	10.01	250 ml in PE bottle



## Electrolyte solutions, aqueous for reference electrodes, as electrolyte bridges and for storage

Order No.	Type No.	Description	Contents
285136956	L 101	Potassium chloride solution 1 mol/l	1,000 ml in DURAN® glass bottle, sterilized
285138649	L 1254	Potassium sulfate solution 0.6 mol/l	250 ml in DURAN® glass bottle
285138151	L 200	Low temperature electrolyte (-30 °C)	1,000 ml in DURAN® glass bottle
285138365	L 2004	Low temperature electrolyte (-30 °C)	250 ml in DURAN® glass bottle
285138349	L 2114	2 mol/l KNO <sub>3</sub> + 0.001 mol/l KCl for Ag combination electrodes	250 ml in DURAN® glass bottle
285136923	L 2214	2 mol/l KNO <sub>3</sub> + 0.001 mol/l KCl for Ag combination electrodes, thickened	250 ml in DURAN® glass bottle
285138332	L 2224	Potassium chloride solution 2 mol/l	250 ml in DURAN® glass bottle
285138554	L 300	Potassium chloride solution 3 mol/l	1,000 ml in DURAN® glass bottle, sterilized
285138427	L 3004	Potassium chloride solution 3 mol/l	250 ml in DURAN® glass bottle, sterilized
285138505	L 3008	Potassium chloride solution 3 mol/l	50 ml in PE bottle
285138419	L 3014	Potassium chloride solution 3 mol/l, Ag/AgCl saturated	250 ml in DURAN® glass bottle
285138468	L 310	Potassium chloride solution 2 mol/l, gel for sterilizable electrodes	1,000 ml in DURAN® glass bottle
285138484	L 3104	Potassium chloride solution 2 mol/l, gel for sterilizable electrodes	250 ml in DURAN® glass bottle
285138702	L 320 K	Potassium chloride solution 2 mol/l, gel for Ag <sub>2</sub> S electrodes	1,000 ml in DURAN® glass bottle
285138143	L 350	Potassium chloride solution 3.5 mol/l	1,000 ml in DURAN® glass bottle, sterilized
285138127	L 3504	Potassium chloride solution 3.5 mol/l	250 ml in DURAN® glass bottle, sterilized
285138587	L 420	Potassium chloride solution 4.2 mol/l	1,000 ml in DURAN® glass bottle
285138608	L 4204	Potassium chloride solution 4.2 mol/l	250 ml in DURAN® glass bottle
285138590	L 911	Storage electrolyte solution, sterilized	1,000 ml in DURAN® glass bottle
285138560	L 9114	Storage electrolyte solution, sterilized	250 ml in DURAN® glass bottle

## Electrolyte solutions, organic for measurements in organic solutions for reference electrodes and as electrolyte bridges

Order No.	Type No.	Description	Contents
285138324	L 5014	LiCl saturated in glacial acetic acid	250 ml in DURAN® glass bottle
285138308	L 5034	LiCl 1,5 mol/l in ethanol	250 ml in DURAN® glass bottle

## Solutions for oxygen measurements

Order No.	Type No.	Description	Contents
285138513	L 6708	Electrolyte for oxygen electrodes OX 1100/OX 1100+/OX 1101	50 ml in PE bottle
285126606	OX 920	Electrolyte for oxygen electrodes 9009/61	50 ml in PE bottle
285126614	OX 921	Cleaning solution for oxygen electrodes 9009/61	30 ml in PE bottle
285138287	OX 060	Zero point solution for oxygen electrodes OX 1100/OX 1100+	60 FIOLAX® ampoules à 20 ml volume = ~17 ml content

## Solutions for ammonia measurements

Order No.	Type No.	Description	Contents
285137344	L 6408	Electrolyte for ammonia combination electrodes	50 ml in PE bottle



# Solutions

## Solutions and accessories for conductivity measurements

Order No.	Type No.	Description	Contents
285126503	LF 990	Test solution KCl 0.001 mol/l (147 $\mu$ S/cm)	3 x 6 FIOLAX® ampoules à 20 ml*, with manufacturer certificate
285126511	LF 991	Test solution KCl 0.01 mol/l (1.41 mS/cm)	3 x 6 FIOLAX® ampoules à 20 ml*, with manufacturer certificate
285126528	LF 992	Test solution KCl 0.1 mol/l (12.9 mS/cm)	3 x 6 FIOLAX® ampoules à 20 ml*, with manufacturer certificate
285126293	LF 995	Test solutions KCl 0.01/0.1/1 mol/l (1.41/12.9/112 mS/cm)	3 x 6 FIOLAX® ampoules à 20 ml*, with manufacturer certificate
285126166	LF 1000/Set	Same as LF 999/set, in addition platinizing vessel and cable B 1 N	3 x 6 FIOLAX® ampoules à 20 ml*, with manufacturer certificate
285136907	LF 1024	Test solution KCl 0.01 mol/l (1.41 mS/cm)	250 ml in PE bottle
285126530	LF CSKC13	Test solution KCl 1.3 $\mu$ S/cm (maximum shelf life: unopened three months, opened six hours)	250 ml in PE bottle
285126540	LF CSKC5	Test solution KCl 5.0 $\mu$ S/cm, (maximum shelf life: six months)	500 ml in PE bottle

## ORP electrode solutions

Order No.	Type No.	Redox voltage Pt/Calomel (KCl sat.)	Pt/Ag/AgCl (KCl 3 mol/l)	Contents
285138373	L 4619	180 mV	220 mV	60 FIOLAX® ampoules à 20 ml*, acc. to DIN 38 404-C6
285138357	L 4643	430 mV	470 mV	60 FIOLAX® ampoules à 20 ml*,
285138381	L 4660	600 mV	640 mV	60 FIOLAX® ampoules à 20 ml*
285138784	L 4648	180, 430, 600 mV	220, 470, 640 mV	3 x 20 FIOLAX® ampoules à 20 ml*
285138184	L 430	430 mV	470 mV	1,000 ml in DURAN® glass bottle
285138168	L 4304	430 mV	470 mV	250 ml in DURAN® glass bottle

## Cleaning solutions for combination electrodes and reference electrodes

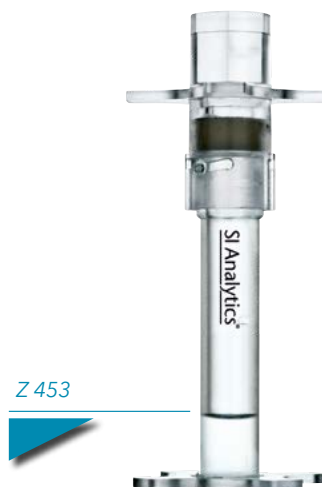
Order No.	Type No.	Description	Contents
285138538	L 510	pepsin/hydrochloric acid solution	1,000 ml in DURAN® glass bottle
285138295	L 5104	pepsin/hydrochloric acid solution	250 ml in DURAN® glass bottle

\* 20 ml volume = ~17 ml content

# 7.7 Electrode accessories

## Accessories for electrodes

Order No.	Type No.	Description
285126482	NH 928	Electrolyte for ammonia electrodes in 50 ml plastic bottle, 3 membrane modules
285126499	NH 995	Membrane module set: 3 membrane modules, 3 caps
285215229	TZ 1520	Taper adapter NS 14.5 of PTFE for electrodes with Ø 12 mm shaft
285123136	Z 451	Measuring and storage vessel with sleeve NS 7.5/16
285123170	Z 453	Electrode vessel for storing electrodes with Ø 12 mm shaft
285123152	Z 461	Measuring and storage vessel with sleeve NS 14.5/23
285123185	Z 472	Watering cap for electrodes with Ø 12 mm shaft



# 7.8 Connection cables

## 1 Electrode socket/plug

Coaxial plug for pH, redox, ammonia and sodium combination electrodes, pH and redox single electrodes as well as reference electrodes in *Plus* series.

Plug L



## 2 Instrument connector/plug

A (DIN 19 262)



BNC



N Banana



Order No.	Type No.	1 Electrode socket/plug	2 Instrument connector/plug	Cable length and type
285121916	B 1 N	Reference electrode plug (B)	Banana plug (N)	1 m single conductor cable
285122456	L 1 A	Electrode plug (L)	DIN instrument plug (A)	1 m coax. cable
285122497	L 1 BNC	Electrode plug (L)	BNC instrument plug	1 m coax. cable
285122550	L 2 N	Electrode plug (L)	Banana plug (N)	2 m coax. cable
285122457	L 1 N	Electrode plug (L)	Banana plug (N)	1 m coax. cable
285122489	L 1 NN	Electrode plug (L)	2 x banana plug (N)	1 m coax. cable
285122464	L 2 A	Electrode plug (L)	DIN instrument plug (A)	2 m coax. cable
285122448	L 2 NN	Electrode plug (L)	2 x 4 mm banana plug (N)	2 m coax. cable

Please ask for more plug and cable combinations.

# Xylem |'zīləm|




- 1) The tissue in plants that brings water upward from the roots;
- 2) a leading global water technology company.

We're a global team unified in a common purpose: creating advanced technology solutions to the world's water challenges. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. Our products and services move, treat, analyze, monitor and return water to the environment, in public utility, industrial, residential and commercial building services settings. Xylem also provides a leading portfolio of smart metering, network technologies and advanced analytics solutions for water, electric and gas utilities. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise with a strong focus on developing comprehensive, sustainable solutions.

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