Lovibond®

Pool & Spa Water Analysis

Instruments and Reagents

Edition: 03/2009

Pool- & Spa Water Testing

Lovibond®

Instruments
and Reagents
for reliable
Water Analysis

QM-System
Zertifikat Nr. 5394
ISO 9001 : 2000

„There are very few companies which can look back over a history of more than 120 years of success. The reason we can do so lies in the world-wide appreciation of our products and the determination of our work-force to maintain this".

Cay-Peter Voss, CEO

Water is the basis of life. And it also provides the basis of our company and its activities. At Tintometer we have always specialized in scientific and technological products which make water analysis not just simple but also dependable and reliable.

For over 120 years we have concentrated on water testing and continue to set new standards in the market. More than 150 employees are working for our customers, meeting their requirements. And achieving our vision: that research and development today will result in a better tomorrow.

Tintometer Group is one of the leading companies in the field of water analysis. Our trade-name Lovibond® is known in over 120 countries, where we offer innovative products for the precise determination of different types of water : water in swimming pools, drinking water, waste water, surface and ground water, untreated water and effluents, through to cooling water and boiler water.



All round the world the highly-qualified and dedicated Tintometer team guarantees optimum equipment for any kind of water analysis.
Our research and development department works closely with institutes in Germany, England, Switzerland and the USA. Together, we are developing new, user-friendly water test systems which we bring to full production level in the shortest possible time.

Outstanding quality, maintained always at the highest level, forms the basis of all our work. And this applies not only to our products, which have been certified to DIN ISO 9001:2000 since 1997, but also to our service. The best proof of this is to ask our customers.



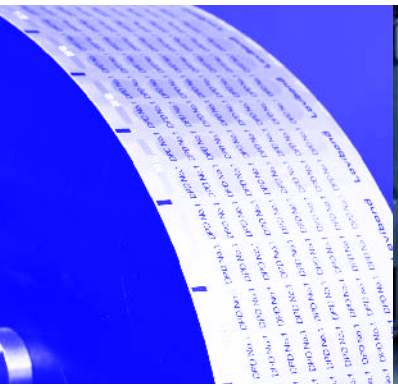
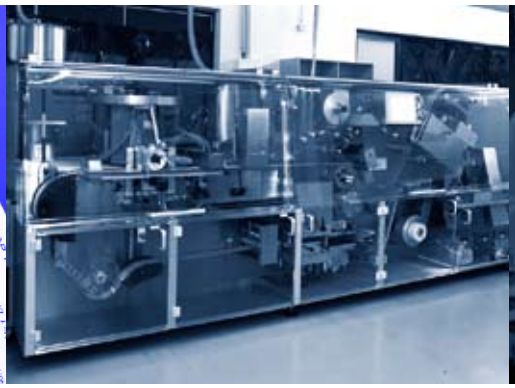
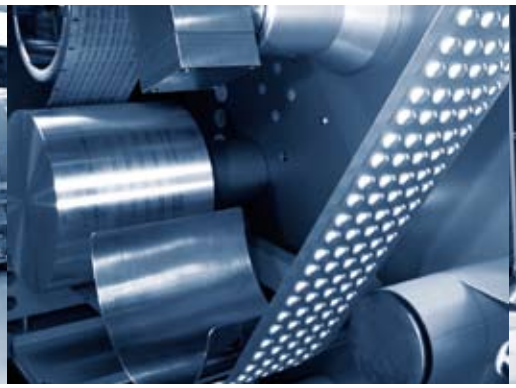
Dear Lovibond® Customer,

We are proud to present our pool water catalogue for Lovibond® water testing equipment, a comprehensive and invaluable source of information that details our full range of instruments, reagents and accessories. There is a detailed index that allows users to identify relevant product information by parameter and test method.

A Single Source for Water Testing Equipment

The Lovibond® range offers users a single source for the chemical analysis of water in private and public pools and spas.

In particular the Lovibond® range presents a simple approach to routine water analysis that gives reliable results.


Ongoing Product Innovation and Development

We are committed to the continuous development and improvement of our testing equipment and reagents. This commitment is demonstrated by an impressive selection of new product introductions, in particular the Photometer MiniDirect, the electronic Pooltester Scuba and the hand-held meters for pH, conductivity, redox, TDS, salinity and temperature.

Production Control and Assurance

The Lovibond® products are manufactured under our control, employing modern technology and QA procedures. Tintometer GmbH has been certified DIN ISO 9001 since 1997.

Web Based Back-up

The information in this catalogue is supported and supplemented by our website – **www.tintometer.com**.

This includes the latest information on product developments and downloads of material safety data sheets and certificates of analysis.

Content

Pools & Spas

Swimming and bathing are without doubt some of the most popular leisure activities, whether at school, in a competitive environment, for exercise or simply relaxation.

The concept of "Wellness" has created a new trend; wellness enthusiasts are people who have made a conscious decision to stay fit and active with the aim of achieving/maintaining good health and a general feeling of well-being and attaining harmony of body, mind and soul.

In order to achieve this goal, people make wide-ranging use of swimming pools, spas, and many other similar facilities.

Regardless of the motivation for swimming and similar activities, people attach great importance to clean and hygienic water both indoors and out.

Water Treatment and Water Testing

State-of-the-art water treatment is an essential precondition for safe and healthy bathing and swimming – whether in private or public facilities. In order to satisfy health-related criteria while maintaining the value of such a facility, the golden rule for water treatment is "as much as necessary and as little as possible".

It goes without saying that the main water quality parameters need to be checked on a regular basis in order to ensure an optimum water treatment programme in changing operating conditions. If testing shows that the hygiene-related parameters deviate from the target values or recommended limit values, the operator can immediately take corrective action to avoid potential risks to health before such risks are allowed to arise.

And this is where the system of Lovibond® water testing equipment and reagents comes into play. The Lovibond® range of instruments provides operators of private and public baths with analysis systems that measure the actual condition and quality of the water with maximum precision. Moreover, the Lovibond® systems succeed in reconciling the seemingly irreconcilable goals of easy handling, safe reagents offering long-term stability, high detection accuracy, and reproducibility of results. We hope you will find the information on the following pages convincing.

Associations–Memberships

In order to support ongoing development in basic and advanced training, standardisation, and chemical and technical innovation, the Tintometer Group of Companies plays an active role in the following associations/federations under its brand name Lovibond®:

Bundesverband Schwimmbad & Wellness e.V.
An Lyskirchen 14
50676 Cologne
Germany
www.bsw-web.de

Bundesverband Deutscher Schwimmmeister e. V.
Römerstr. 151
50389 Wesseling
Germany
www.bds-ev.de

Bundesverband der Hygieneinspektoren e. V.
Hohenstaufenstr. 62
10781 Berlin
Germany
www.bundesverband-hygieneinspektoren.de

TÜV Rheinland Akademie GmbH
TÜV Rheinland Group
Rhinstr. 46
12681 Berlin
Germany
www.tuev-schwimmbadbauer.de

Verein zur Förderung des IWW Rheinisch-Westfälisches Institut für Wasserforschung e. V.
Moritzstraße 26
45476 Mülheim an der Ruhr
Germany
www.iww-online.de

The Swimming Pool and Allied Trades Association
1a Junction Road, Andover,
Hampshire, England SP10 3QT
UK
www.spata.co.uk

Schweizerische Vereinigung von Firmen für Wasser- und Schwimmbadtechnik
Schlösslistraße 9 A
3001 Bern
Switzerland
www.aquasuisse.ch

APSP
The Association of Pool & Spa Professionals
2111 Eisenhower Ave.
Alexandria, VA 22314
USA
www.apsp.org

Rapid Tests

Acid Demand
Active Oxygen
Biguanide (PHMB)
Bromine
Calcium Hardness
Chloride
Chlorine
Copper
Cyanuric Acid
Hydrogen Peroxide
pH-value
QAC
Sulphate
Total Alkalinity
Total Hardness

Water Treatment

pH value

The pH value of pool & spa water should generally be between the slightly acidic value of 6.5 and the slightly basic value of 7.6. Due to the use of various water treatment chemicals as well as ambient environmental effects, pool owners have to determine the pH of the water and correct the value as necessary.

DISINFECTION

Nowadays, pool owners can choose from a range of modern water treatment agents that are often used in combination.

These water treatment chemicals are only effective within a limited pH range. Therefore in addition to checking the concentration of the water treatment chemicals, the owner/ operator should also monitor the pH value of pool water and adjust it if necessary.

MINITESTER

The MINITESTER with an interchangeable colour comparison chart is a competitively priced starter unit with one measuring chamber for the determination of either chlorine, bromine, active oxygen and the pH value.

THREE-CHAMBER TESTER

The THREE-CHAMBER TESTER with an interchangeable colour comparison chart is a competitively priced unit for the determination of disinfectants and the pH value.

POOLTESTER

The POOLTESTER allows simultaneous determination of the most popular water treatment agents and the pH value.

POOLCHECK

The term "balanced water" is used to describe water that is neither corrosive nor prone to scale formation.

The function of the POOLCHECK is to test for these water properties. The POOLCHECK comprises all the components required for determination of free chlorine, pH value, calcium hardness, total alkalinity and, optionally, acid demand and cyanuric acid.

All the above testers, determinations, ranges and refill packs are listed on the following two pages.

Highlights

- fast • accurate • simple
- ready to use
- RAPID tablets fast dissolving

MINITESTER

Item	Code
Chlorine-pH Chlorine 0.1–3.0 mg/l / pH value 6.8–8.2	15 70 60
Bromine-pH Bromine 1–8 mg/l / pH value 6.8–8.2	15 80 20
Active Oxygen-pH Active Oxygen 0–10 mg/l / pH value 6.8–8.2	15 73 80

Delivery content

Each MINITESTER includes tablets in foil for 20 tests and a multi-lingual instruction in a bubble pack. Pack contains 6 units.

THREE-CHAMBER-TESTER

Item	Code
Chlorine-pH LR[1)] Chlorine 0.1–3.0 mg/l / pH value 6.8–8.2	15 75 20
Chlorine-pH HR[1)] Chlorine 0.5–6.0 mg/l / pH value 6.8–8.2	15 80 10
Bromine-pH[1)] Bromine 1.0–8.0 mg/l / pH value 6.8–8.2	15 72 00
Active Oxygen-pH[1)] Active Oxygen 0 – 10 mg/l pH value 6.8–8.2	15 76 10
Biguanide (PHMB)-pH[1)] Biguanide (PHMB) 10–100 mg/l pH value 6.8–8.2	15 61 50
3 in 1[2)] Chlorine 0.1–3.0 mg/l / pH value 6.8–8.2 Total Alkalinity 50–300 mg/l	15 75 30
4 in 1[2)] Chlorine 0.1–3.0 mg/l / pH value 6.8–8.2 Total Alkalinity 50–300 mg/l Cyanuric Acid 20–100 mg/l	15 75 40
5 in 1[2)] Chlorine 0.5–6.0 mg/l / pH value 6.8–8.2 Total Alkalinity 50–300 mg/l Cyanuric Acid 20–100 mg/l Calcium Hardness 50–300 mg/l	15 75 50
6 in 1[2)] Chlorine 0.5–6.0 mg/l / pH value 6.8–8.2 Total Alkalinity 50–300 mg/l Cyanuric Acid 20–100 mg/l Calcium Hardness 50–300 mg/l Acid Demand	15 75 60

[1)] in bubble pack [2)] in plastic case

Delivery content

Each THREE-CHAMBER-TESTER includes foil packed tablets for 20 tests and a multi-lingual instruction manual in a bubble pack.
Pack contains 6 units.

POOLTESTER

Item	Code
Chlorine-pH LR Chlorine 0.1–3.0 mg/l / pH value 6.8–8.2	15 10 50
Chlorine-pH HR Chlorine 0.5–6.0 mg/l / pH value 6.8–8.2	15 10 60
Bromine-pH Bromine 1.0–8.0 mg/l / pH value 6.8–8.2	15 10 80
Active Oxygen-pH O_2 0–10 mg/l / pH value 6.8–8.2	15 13 36
Copper (free)-pH Copper 0.1–0.9 mg/l / pH value 6.8–7.8	15 52 30
Biguanide (PHMB)-Hydrogen Peroxide (H_2O_2)-pH PHMB 10–100 mg/l / H_2O_2 5–50 mg/l pH value 6.8–8.2	15 61 00
Quaternary Ammonia Compounds (QAC)-pH QAC 25–150 mg/l / pH value 6.8–8.2	15 10 40

Delivery content

Each POOLTESTER includes foil packed tablets for 20 tests and a multi-lingual instruction manual in a plastic box. Pack contains 12 units.

POOLCHECK

Item	Code
4 in 1 Kit LR Chlorine 0.1–3.0 mg/l, pH value 6.8–8.2 Calcium Hardness 100–200 mg/l Total Alkalinity 25–200 mg/l	15 62 00
4 in 1 Kit HR Chlorine 0.5–5.0 mg/l, pH value 6.8–8.2 Calcium Hardness 100–200 mg/l Total Alkalinity 25–200 mg/l	15 62 10
5 in 1 Kit LR Chlorine 0.1–3.0 mg/l, pH value 6.8–8.2 Calcium Hardness 100–200 mg/l Total Alkalinity 25–200 mg/l Cyanuric Acid 20–100 mg/l	15 62 20
5 in 1 Kit HR Chlorine 0.5–5.0 mg/l, pH value 6.8–8.2 Calcium Hardness 100–200 mg/l Total Alkalinity 25–200 mg/l Cyanuric Acid 20–100 mg/l	15 62 30
6 in 1 Kit LR Chlorine 0.1–3.0 mg/l, pH value 6.8–8.2 Calcium Hardness 100–200 mg/l Total Alkalinity 25–200 mg/l Cyanuric Acid 20–100 mg/l, Acid Demand	15 62 60
6 in 1 Kit HR Chlorine 0.5–5.0 mg/l, pH value 6.8–8.2 Calcium Hardness 100–200 mg/l Total Alkalinity 25–200 mg/l Cyanuric Acid 20–100 mg/l, Acid Demand	15 62 70

Delivery content

Each kit includes the POOLCHECK unit, accessories, reagents for 20 tests and a multi-lingual instruction manual packed into a plastic case. Pack contains 12 units.

Refill Packs

Item	Code
Chlorine / pH* 30 DPD No.1 / RAPID-tablets and 30 PHENOL RED / RAPID-tablets	51 58 84
Bromine / pH* 30 DPD No.1 / RAPID-tablets and 30 PHENOL RED / RAPID-tablets	51 58 68
Active Oxygen - pH* 30 DPD No.4 / RAPID-tablets and 30 PHENOL RED / RAPID-tablets	51 59 34
PHMB/H_2O_2 - pH* 20 PHMB-, 20 H_2O_2-, 20 ACIDIFYING PT- and 20 PHENOL RED / RAPID-tablets	51 58 70
PHMB - pH* 30 PHMB-tablets and 30 PHENOL RED / RAPID-tablets	51 61 55
QAC HR - pH* 20 QAC-, 20 ACIDIFYING GP- and 20 PHENOL RED / RAPID-tablets	51 58 69
Copper (free) - pH* 20 COPPER / ZINC-tablets and 20 DECHLOR-tablets 20 PHENOL RED / RAPID-tablets	51 58 73
4 in 1 and 5 in 1* 20 DPD No.1/ RAPID-, 20 PHENOL RED / RAPID-, 10 CALC-, 10 CAL-, 20 ALKACHECK- and 20 CYANURIC ACID-tablets	51 58 71
6 in 1* 20 DPD No.1/ RAPID-, 20 PHENOL RED / RAPID-, 10 CALC-, 10 CAL-, 20 ALKACHECK- and 1 bottle Acid Demand Reagent	51 58 72

* Each pack contains 12 units

Tablet Reagents

Item	Quantity	Code
DPD No.1 / RAPID ★	100	51 13 10BT
	250	51 13 11BT
	500	51 13 12BT
DPD No.3 / RAPID ★	100	51 12 90BT
	250	51 12 91BT
	500	51 12 92BT
DPD No.4 / RAPID ★	100	51 15 70BT
	250	51 15 71BT
	500	51 15 72BT
PHENOL RED/RAPID	100	51 17 90BT
	250	51 17 91BT
	500	51 17 92BT
QAC HR	100	51 54 00
	250	51 54 01
	500	51 54 02
Biguanide (PHMB)	100	51 58 90
	250	51 58 91

★ also suitable for seawater

Highlights

- Lovibond®-RAPID tablets DPD and PHENOL RED will dissolve quickly, have a guaranteed 10 year shelf-life and are provided in green-printed foil blister.
- Material Safety Data Sheets: www.tintometer.com

MINIKIT

Analysis	Type	Range	Methods: Tablet Count	Speed Test	Yes/No Test	Turbidity	Code
Alkalinity, Total-M	AF 413	10 - 500 mg/l $CaCO_3$ ≅ 0.1 - 5 mmol/l	■				41 41 30
Alkalinity, Total-M	AF 444	20 - 800 mg/l $CaCO_3$ ≅ 0.4 - 16 mmol/l		■			41 44 40
Alkalinity-P	AF 414	20 - 500 mg/l $CaCO_3$ ≅ 0.2 - 5 mmol/l	■				41 41 40
Calcium Hardness	AF 446	20 - 800 mg/l $CaCO_3$ ≅ 0.4 - 16 mmol/l		■			41 44 60
Calcium Hardness	AF 416	10 - 500 mg/l $CaCO_3$ ≅ 0.1 - 5 mmol/l	■				41 41 60
Chloride ★	AF 418	5 - 5000 mg/l Cl	■				41 41 80
Cyanuric Acid	AF 422	20 - 200 mg/l				■	41 42 20
QAC (Quaternary Ammonium Comp.)	AF 417	0 - 500 mg/l active QAC Limit 200 mg/l (Yes/No)	■		■		41 41 70
Sulphate ★	AF 431	40 - 4000 mg/l SO_4				■	41 43 10
Total Hardness	AF 424	5 - 500 mg/l $CaCO_3$ ≅ 0.05 - 5 mmol/l		■			41 42 40
Total Hardness	AF 445	20 - 800 mg/l $CaCO_3$ ≅ 0.4 - 16 mmol/l	■				41 44 50

★ also suitable for seawater

The Methods

The MINIKITS are developed for fast testing, mainly based on titrimetric methods

Tablet count method

A specific number of tablets is added to a known volume of sample until a chemically induced colour change takes place. The number of tablets used is applied to a simple formula to calculate the test result. The measuring range may be expanded by varying the sample volume.

Speed test

The speed test is based on reverse titration. After adding a reagent tablet to a calibrated test tube, the water sample is added slowly until the colour of the solution changes (e.g. from red to blue). The user can then obtain the result from the liquid level.

Yes/No test

A Yes/No test tells the user whether a specific ingredient is present in the water and/or if its concentration is higher or lower than a defined level.

Turbidity method

A two-section calibrated test tube is filled with the water sample and a reagent tablet added. The reagent creates a level of turbidity that is proportional to the concentration of the parameter being measured. The inner tube, which has a black dot on its base, is lowered until the dot is obscured by the turbidity. The result is read off from the water level in the inner tube.

Delivery content

Each kit contains sufficient tablet reagents for an average of 30 to 50 tests, sample container and a multilingual instruction manual.

Tablet Reagents	Code	Quantity
ALKALINITY-M BaCl2-Tablets	515321 515110	250 100
ALK-TEST	515570	100
ALKALINITY-P	515101	250
CAL-TEST	515580	100
CALCIUM HARDNESS	515190	100
CHLORIDE	515131	250
CYANURIC ACID	511320BT	100
QAC-Test	515410 515411	100 250
SULFATE	515451	250
TOTAL HARDNESS	515161	250
T HARDNESS-TEST	515590	100

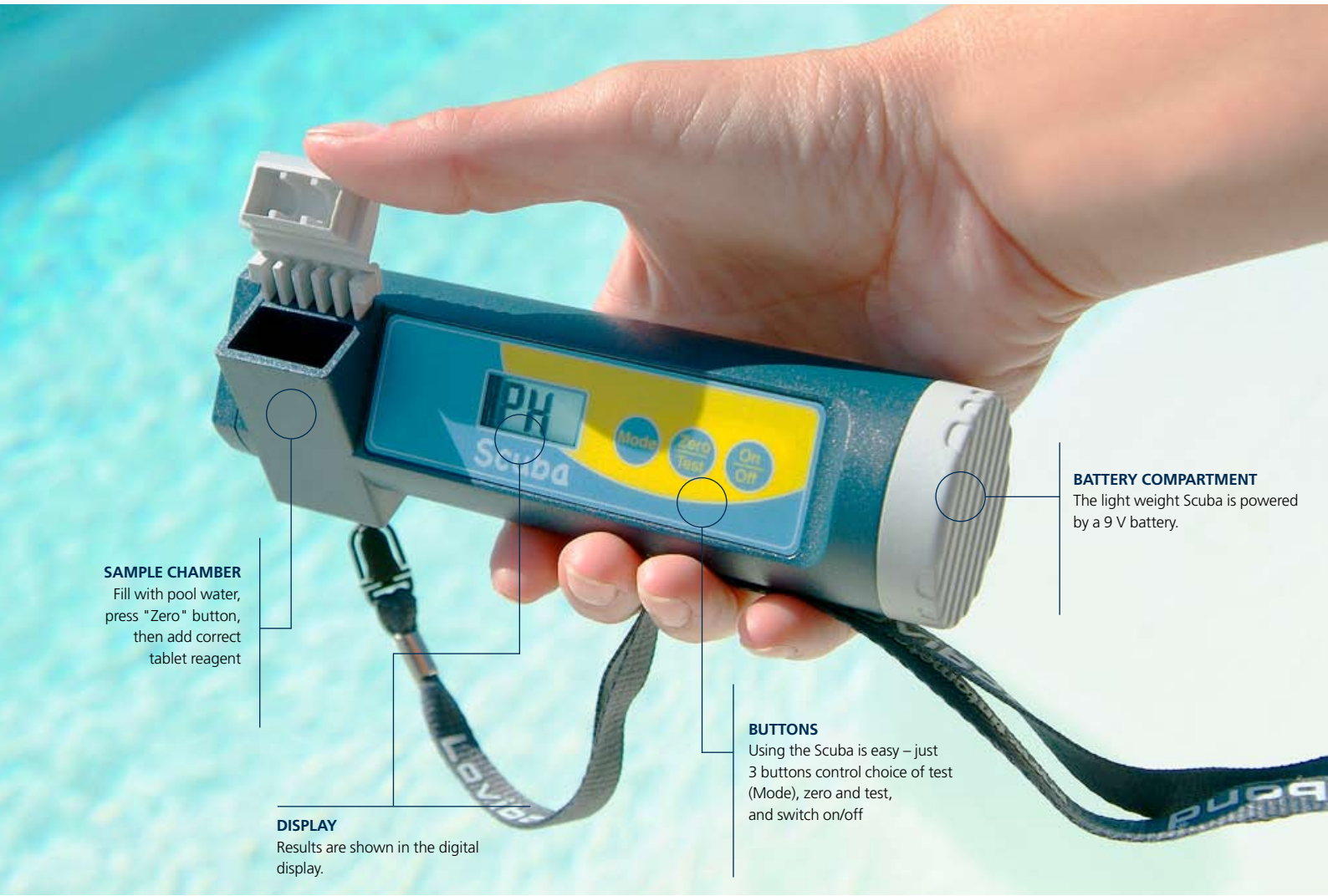
Highlights

- Easy operation and exact reagent dosing
- Measurement accuracy
- Unrestricted shipment and safe storage
- Foil-wrapped tablet reagents with a guaranteed shelf life of 5 years

MSDS (Material Safety Data Sheets): www.tintometer.com

Scuba and Scuba +

The Digital Generation of Pool Testers



Source: haus & wellness

For the discerning domestic pool and spa operator

www.tintometer.com/scuba

Scuba and Scuba +

For peace of mind, anyone owning a pool should carry out regular checks on the most important characteristics of the water in the pool (the so-called hygiene parameters). So the quality of the water can be checked and the water treatment chemicals can be dosed to meet the requirements.

The Scuba is an immersible test device which uses a similar technology to that used in public pools. A sample of the water is tested using the photometric principle and the result is shown in the digital display. Compared to visual pooltester systems this eliminates the risk of wrong colour readings. The unit has a modern housing designed to meet ergonomic requirements and is, of course, fully watertight.

The Scuba is supplied with specially formulated, quick-dissolving reagent tablets (identified by their white foil packaging). It also has a handy strap so that it can be hung safely in a storage area.

www.tintometer.com/scuba

Technical Data

Optics	temperature-compensated LED (λ = 528 nm) and photo-sensor
Power supply	9V battery (supplied)
Auto-Off	automatic shut-off
Display	LCD display
Dimensions (L x B x H)	150 x 45 x 50 mm
Weight	ca. 100 g
Operating conditions	temperature: 0 – 40°C relative humidity: 30 – 90%, non-condensing
CE	EN 50081-1 VDE 0839 Teil 81-1:1993-3 EN 50082-2 VDE 0839 Teil 82-2:1996-02

Highlights

- Watertight housing
- Digital display
- Rapid-dissolving tablets
- Weight only approx. 100 g

Delivery Content

Each Scuba is supplied with a pack of reagent tablets (see "combi-packs" for details), multi-language operating instructions, a handy carrying strap and a 9V battery in a blister pack. The unit is immediately ready to use.

Reagent tablets for Scuba and Scuba +

52 55 00	DPD FREE	BLISTER PACK, 50 pieces
52 55 10	DPD TOTAL	BLISTER PACK, 50 pieces
52 55 20	PH 6.5 - 8.4	BLISTER PACK, 50 pieces
52 55 30	STABILIZER	BLISTER PACK, 50 pieces
52 55 40	ALKALINITY	BLISTER PACK, 50 pieces

Combi-packs for Scuba and Scuba +

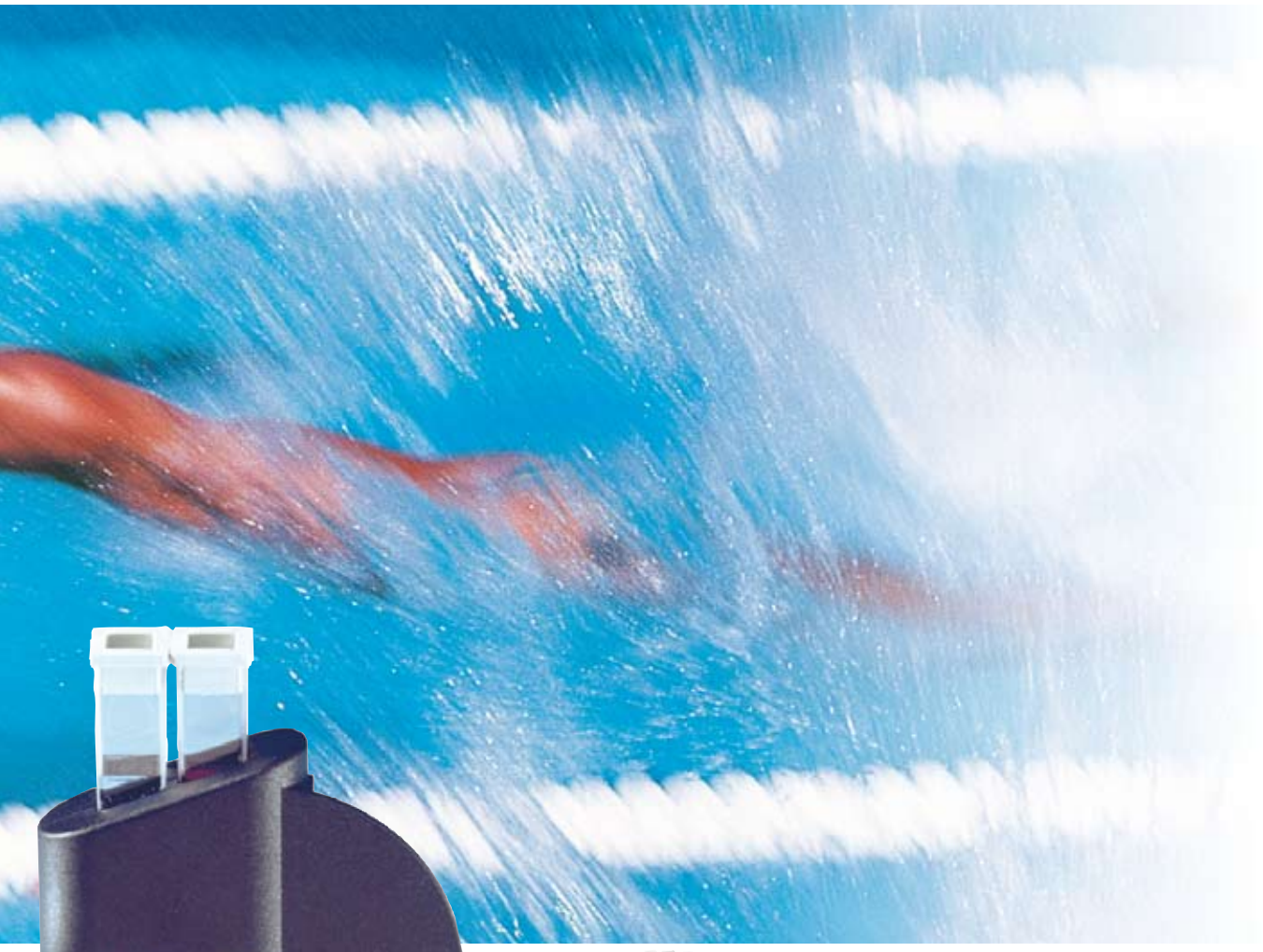
52 55 50	10 DPD FREE, 10 PH, 10 DPD TOTAL, 10 STABILIZER	Scuba
52 55 60	10 DPD FREE, 10 PH, 10 DPD TOTAL, 10 STABILIZER, 10 ALKALINITY	Scuba +

Combi-packs are supplied with the Scuba/Scuba +

Scuba	Scuba	Scuba +	Determination	Range	Resolution	Accuracy
■	■	■	Chlorine (free + total)	0 - 6 mg/l Cl_2	0.01 mg/l	0 - 1 mg/l ± 0.2 mg/l ; 1 - 2 mg/l ± 0.3 mg/l 2 - 3 mg/l ± 0.4 mg/l ; 3 - 6 mg/l ± 0.5 mg/l
		■	Bromine	0 - 13 mg/l Br	0.01 mg/l	0 - 2 mg/l ± 0.5 mg/l ; 2 - 4 mg/l ± 0.7 mg/l 4 - 7 mg/l ± 0.9 mg/l ; 7 - 13 mg/l ± 1.2 mg/l
■	■	■	pH value	6.5 - 8.4 pH	0.01 pH	± 0.2 pH
■		■	Stabilizer	0 - 80 mg/l Cys	1.0 mg/l	± 10 mg/l
	■	■	Alkalinity	0 - 500 mg/l $CaCO_3$	1.0 mg/l	± 50 mg/l
21 60 00	21 60 20	21 60 10				

Pack contains 6 Scuba or Scuba +

CHECKIT®Comparator



with
continuous
colour scales

Front view of the CHECKIT®Comparator with cells

Test Kit in carrying case, ready to use

Plastic cells, frosted on two sides,
volume 10 ml, path length 13.5 mm, with lids

Rear view of the CHECKIT®Comparator
with diffuser plate, cells and disc

CHECKIT®Discs with continuous and stable scales

Tablet reagents in foil blister strips,
DPD No.1/3/4, Phenol Red, Cyanuric Acid,
code no. supplement BT

CHECKIT®Comparator

The Lovibond® CHECKIT® comparator is a compact, handy colorimetric unit which is suitable for both mobile and static analysis work. Supplied with a generous number of different colour scales, it provides the basis for a comprehensive, easy-to-use colorimetric analysis system.

CHECKIT®Disc

Each CHECKIT®Disc contains a continuous colour scale which makes it possible to achieve an exact colour match between the colour standard and the sample. These CHECKIT®Discs are specially manufactured in selected materials to retain colour-stability over a long period and guarantee reliable, reproducible measurement results.

Please see pages 22 onwards for tests, ranges and reagents

Highlights

- Easy operation
- Exact reagent dosing
- Tablet reagents with a guaranteed shelf life of 5/10 years
- Measurement accuracy
- Unrestricted shipment
- Safe storage

CHECKIT®Comparator

Photo: Riviera Pool

Colorimeter for regular testing in **domestic** Pools and Spas

TEST KITS

Test Kits 2 in 1	Code
Chlorine 0 – 1.0 mg/l Cl_2* **pH value** 6.5 – 8.4 pH	14 70 16
Chlorine 0.1 – 2.0 mg/l Cl_2* **pH value** 6.5 – 8.4 pH	14 70 46
Chlorine 0 – 4.0 mg/l Cl_2* **pH value** 6.5 – 8.4 pH	14 70 26
Bromine 0 – 5.0 mg/l Br **pH value** 6.5 – 8.4 pH	14 72 85
Copper 0 – 1.0 mg/l Cu **pH value** 6.5 – 8.4 pH	14 72 35

Test-Kit 5 in 1 Water Balance	Code
Chlorine 0 – 4.0 mg/l Cl_2* **pH value** 6.5 – 8.4 pH **Cyanuric acid** (turbidity method)* 20 – 200 mg/l Cys **Calcium hardness** (Speed-Test)* 20 – 800 mg/l $CaCO_3$ **Total Alkalinity (M)** (Speed-Test)* 20 – 800 mg/ $CaCO_3$	14 70 28

Disc readings see following pages
* All test kits for chlorine are for "free, combined and total chlorine"
** Reagents for turbidity method and speed-test (Test-Kit 5 in 1) see MINIKIT

Single Parameter Test Kit	Range* (±5% Full Scale)	Reagent	Code
Aluminium	0 - 0.3 mg/l Al	Tablets	14 72 00
Ammonia ★	0 - 1 mg/l N	Tablets	14 72 10
Ammonia	0 - 0.5 mg/l N	Powder Reagents	14 72 11
Bromine	0 - 5 mg/l Br	Tablets	14 72 80
Chlorine (DPD), free, comb., total ★	0 - 1 mg/l Cl_2	Tablets	14 70 10
Chlorine (DPD), free, comb., total ★	0.1 - 2 mg/l Cl_2	Tablets	14 70 40
Chlorine (DPD), free, comb., total ★	0 - 4 mg/l Cl_2	Tablets	14 70 20
Chlorine (DPD) free+total ★	0 - 3.5 mg/l Cl_2	Powder Reagents	14 70 52
Copper, free (Cu^{2+})	0 - 1 mg/l Cu	Tablets	14 72 30
Copper HR, free + total ★	0 - 5 mg/l Cu	Tablets	14 74 30
Copper HR, free	0 - 5 mg/l Cu	Powder Reagents	14 74 31
Copper LR,** free	0 - 1 mg/l Cu	Powder Reagents	14 74 41
Iron HR ★	1 - 10 mg/l Fe	Tablets	14 73 20
Iron LR ★	0.05 - 1 mg/l Fe	Tablets	14 72 20
Iron	0 - 1.8 mg/l Fe	Powder Reagents	14 74 70
Nitrate HR	10 - 100 mg/l NO_3	Tablets	14 74 00
Ozone (DPD)	0 - 0.7 mg/l O_3	Tablets	14 72 70
pH value (Phenol red)	6.5 - 8.4 pH	Tablets	14 71 00
pH value (Bromocresol purple)	5.2 - 6.8 pH	Tablets	14 71 10
pH value (Universal)	4 - 10 pH	Tablets	14 71 30
Phosphate HR ★	0 - 80 mg/l PO_4	Tablets	14 72 50
Sodiumhypochlorite	2 - 18 % NaOCl	Tablets	14 74 90
Total Alkalinity	20 - 240 mg/l $CaCO_3$	Tablets	14 74 50

* Disc readings see following pages
** Only with CHECKIT®Comparator D55 with mirror optics (path length 55 mm)

★ also suitable for seawater

Delivery content

CHECKIT® Comparator, Disc(s), 3 cells, stirring rod and Lovibond® tablet reagents for 30 tests each, instruction manual, guarantee sheet.

Please see pages 22 onwards for tests, ranges and reagents

Plastic cells in pack, available: 5 cells - 14 55 05
10 cells - 14 55 00
100 cells - 14 55 10

Testpak

The Testpak is a simple and cost-effective means of extending the use of an existing CHECKIT®Comparator instrument to a new test parameter.

All you need is the basic CHECKIT®Comparator, order code 14 50 00.

Testpaks: see following pages.

Delivery content

Each Testpak contains the required CHECKIT®Disc, tablet reagents for approx. 30 tests, two cells, stirring rod and detailed instructions.

CHECKIT®Comparator

Tests, Test Kits, Testpaks, Discs, Reagents

Test	Range	Readings (Accuracy ± 5% Fullscale)	Test Kit	Testpak
Alkalinity-M Tablets	20 - 240 mg/l $CaCO_3$	20 /30 / 40 / 50 / 60 / 70 / 80 / 90 / 100 / 110 / 120 / 130 140 / 150 / 160 / 170 / 180 / 190 / 200 / 220 / 240	14 74 50	14 79 50
Aluminium Tablets	0 - 0.3 mg/l Al	0 / 0.01 / 0.02 / 0.03 / 0.04 / 0.05 / 0.06 / 0.07 / 0.08 / 0.09 / 0.1 / 0.15 / 0.2 / 0.25 / 0.3	14 72 00	14 77 00
Ammonia ✶	0 - 1 mg/l N	0 / 0.05 / 0.1 / 0.15 / 0.2 / 0.25 / 0.3 / 0.35 / 0.4 / 0.45 / 0.5 / 0.55 / 0.6 / 0.65 / 0.7 / 0.75 / 0.8 / 0.9 / 0.95 / 1.0	14 72 10	14 77 10
Ammonia VARIO Powder Reagent	0 - 0.5 mg/l N	0 / 0.05 / 0.1 / 0.15 / 0.2 / 0.25 / 0.3 / 0.35 / 0.4 / 0.45 / 0.5	14 72 11	14 77 11
Bromine Tablets	0 - 5 mg/l Br	0 / 0.2 / 0.4 / 0.6 / 0.8 / 1.0 / 1.2 / 1.4 / 1.6 / 1.8 / 2 / 2.5 / 3 / 3.5 / 4 / 4.5 / 5	14 72 80	14 77 80
Chlorine ✶ free, combined, total Tablets	0 - 1 mg/l Cl_2	0 / 0.05 / 0.1 / 0.15 / 0.2 / 0.25 / 0.3 / 0.35 / 0.4 / 0.45 / 0.5 / 0.55 / 0.6 / 0.65 / 0.7 / 0.75 / 0.8 / 0.85 / 0.9 / 0.95 / 1.0	14 70 10	14 75 10
	0.1 - 2 mg/l Cl_2	0.1 / 0.2 / 0.3 / 0.4 / 0.5 / 0.6 / 0.7 / 0.8 / 0.9 / 1.0 / 1.1 / 1.2 / 1.3 / 1.4 / 1.6 / 1.8 / 2.0	14 70 40	14 75 40
	0 - 4 mg/l Cl_2	0 / 0.2 / 0.4 / 0.6 / 0.8 / 1.0 / 1.2 / 1.4 / 1.6 / 1.8 / 2.0 / 2.5 / 3.0 / 3.5 / 4.0	14 70 20	14 75 20
free + total Powder Reagent	0 - 3.5 mg/l Cl_2	0 / 0.2 / 0.4 / 0.6 / 0.8 / 1 / 1.2 / 1.4 / 1.6 / 1.8 / 2 / 2.2 / 2.4 / 2.6 / 2.8 / 3 / 3.2 / 3.4 / 3.5	14 70 52	14 75 50, free 14 75 51, total
Copper, free (Cu^{2+}) Tablets	0 - 1 mg/l Cu	0 / 0.05 / 0.1 / 0.15 / 0.2 / 0.25 / 0.3 / 0.35 / 0.4 / 0.45 / 0.5 / 0.55 / 0.6 / 0.7 / 0.8 / 1.0	14 72 30	14 77 30
Copper HR free and total Tablets	0 - 5 mg/l Cu	0 / 0.5 / 1.0 / 1.5 / 2.0 / 2.5 / 3.0 / 3.5 / 4.0 / 4.5 / 5.0	14 74 30	14 79 30
Copper HR, free only Powder Reagent	0 - 5 mg/l Cu	0 / 0.5 / 1 / 1.5 / 2 / 2.5 / 3 / 3.5 / 4 / 5	14 74 31	14 79 31
Copper LR, free only Powder Reagent	0 - 1 mg/l Cu	0 / 0.05 / 0.1 / 0.15 / 0.2 / 0.25 / 0.3 / 0.35 / 0.4 / 0.45 / 0.5 / 0.6 / 0.7 / 0.8 / 0.9 / 1.0 Only with CHECKIT®Comparator D55 with mirror optics (path length 55 mm)	14 74 41	14 79 41

* RAPID: fast dissolving tablets, # including stirring rod, 10 cm, ✶ also suitable for seawater

Disc	Reagents	Quantity	Code
14 64 50	ALKACHECK	100	51 32 00
		250	51 32 01
14 62 00	ALUMINIUM No.1	100	51 54 60
		250	51 54 61
	ALUMINIUM No.2	100	51 54 70
		250	51 54 71
	Combi pack#	each 100	51 76 01
	ALUMINIUM No.1 / No.2	each 250	51 76 02
14 62 10	AMMONIA No.1	100	51 25 80
		250	51 25 81
	AMMONIA No.2	100	51 25 90
		250	51 25 91
	Combi pack#	each 100	51 76 11
	AMMONIA No.1 / No.2	each 250	51 76 12
14 62 11	VARIO Ammonia Salicylate F10	Powder Pack / 200	
	VARIO Ammonia Cyanurate F10	Powder Pack / 200	
		Set	53 55 00
14 62 80	DPD No.1-RAPID*	100	51 13 10
		250	51 13 11
		500	51 13 12
14 60 10	DPD No.1-RAPID*	100	51 13 10BT
		250	51 13 11BT
		500	51 13 12BT
	DPD No.3-RAPID*	100	51 12 90BT
		250	51 12 91BT
		500	51 12 92BT
	DPD No.4-RAPID*	100	51 15 70BT
		250	51 15 71BT
		500	51 15 72BT
14 60 40	DPD No.1/3/4-RAPID*		
14 60 20	DPD No.1/3/4-RAPID*		
14 60 50	VARIO Chlorine Free DPD F5	100	53 00 90
	VARIO Chlorine Total DPD F5	100	53 00 80
14 62 30	COPPER/ZINC LR	100	51 26 20
		250	51 26 21
14 64 30	COPPER No. 1	100	51 35 50
		250	51 35 51
	COPPER No. 2	100	51 35 60
		250	51 35 61
	Combi pack#	each 100	51 76 91
	COPPER No.1 / No.2	each 250	51 76 92
14 64 31	Vario Cu1 F10	100	53 03 00
14 64 41	Vario Cu1 F10	100	53 03 00

Material Safety Data Sheets: www.tintometer.com

CHECKIT® Comparator

Tests, Test Kits, Testpaks, Discs, Reagents

Test	Range	Readings (Accuracy ± 5% Fullscale)	Test Kit	Testpak
Iron LR ✶ Tablets	0.05 - 1 mg/l Fe	0.05 / 0.1 / 0.15 / 0.2 / 0.25 / 0.3 / 0.35 / 0.4 / 0.45 / 0.5 / 0.55 / 0.6 / 0.65 / 0.7 / 0.75 / 0.8 / 0.9 / 1.0	14 72 20	14 77 20
Iron HR ✶ Tablets	1 - 10 mg/l Fe	1 / 1.5 / 2 / 2.5 / 3 / 3.5 / 4 / 4.5 / 5 / 5.5 / 6 / 6.5 / 7 / 7.5 / 8 / 8.5 / 9 / 10	14 73 20	14 78 20
Iron Powder Reagent	0 - 1.8 mg/l Fe	0.1 / 0.2 / 0.3 / 0.4 / 0.5 / 0.6 / 0.7 / 0.8 / 0.9 / 1 / 1.1 / 1.2 / 1.3 / 1.4 / 1.5 / 1.6 / 1.7 / 1.8	14 74 70	14 79 70
Manganese LR TESTPAK available only	0.1 - 0.7 mg/l Mn	0.1 / 0.15 / 0.2 / 0.25 / 0.3 / 0.35 / 0.4 / 0.45 / 0.5 / 0.55 / 0.6 / 0.65 / 0.7	------	14 79 10
Nitrate HR Tablets	10 - 100 mg/l NO_3	10 / 20 / 30 / 40 / 50 / 60 / 70 / 80 / 90 / 100	14 74 00	14 79 00
Ozone (DPD) Tablets	0 - 0.7 mg/l O_3	0 / 0.05 / 0.1 / 0.15 / 0.2 / 0.25 / 0.3 / 0.35 / 0.4 / 0.45 / 0.5 / 0.55 / 0.6 / 0.65 / 0.7	14 72 70	14 77 70
pH Tablets	5.2 - 6.8 pH	5.2 / 5.3 / 5.4 / 5.5 / 5.6 / 5.7 / 5.8 / 5.9 / 6.0 / 6.1 / 6.2 / 6.3 / 6.4 / 6.5 / 6.6 / 6.7 / 6.8	14 71 10	14 76 10
	6.5 - 8.4 pH	6.5 / 6.6 / 6.7 / 6.8 / 6.9 / 7.0 / 7.1 / 7.2 / 7.3 / 7.4 / 7.5 / 7.6 / 7.7 / 7.8 / 7.9 / 8.0 / 8.1 / 8.2 / 8.3 / 8.4	14 71 00	14 76 00
	4 - 10 pH	4 / 4.5 / 5 / 5.5 / 6 / 6.5 / 7 / 7.5 / 8 / 8.5 / 9 / 9.5 / 10	14 71 30	14 76 30
Phosphate HR ✶ Tablets	0 - 80 mg/l PO_4	0 / 5 / 10 / 15 / 20 / 25 / 30 / 35 / 40 / 45 / 50 / 55 / 60 / 65 / 70 / 75 / 80	14 72 50	14 77 50
Sodiumhypochlorite Tablets	2 - 18 % NaOCl	2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10 / 11 / 12 / 13 / 14 / 15 / 16 / 18	14 74 90	14 79 90

* RAPID: fast dissolving tablets, # including stirring rod, 10 cm, ✶ also suitable for seawater

Disc	Reagents	Quantity	Code
14 62 20	IRON LR	100	51 53 70
		250	51 53 71
	IRON (II) LR	100	51 54 20
14 63 20	IRON HR	100	51 53 80
		250	51 53 81
14 64 70	VARIO Iron TPTZ F10	100	53 05 50
14 64 10	VARIO Alkaline-Cyanide Reagent Solution	Bottle 50 ml	53 06 20
	VARIO PAN Indicator Solution, 0.1 %	Bottle 50 ml	53 06 30
	VARIO Ascorbic Acid	Powder pack	54 11 00
14 64 00	NITRACHECK No. 1	100	51 75 00
		250	51 75 01
	NITRACHECK No. 2	100	51 75 10
		250	51 75 11
	Combi pack#	each 100	51 77 01
	NITRACHECK No.1 / No.2	each 250	51 77 02
14 62 70	DPD No. 4-RAPID*	100	51 15 70BT
		250	51 15 71BT
	DPD Glycine	100	51 21 70BT
		250	51 21 71BT
14 61 10	BROMOCRESOL PURPLE	100	51 17 30
		250	51 17 31
14 61 00	PHENOL RED-RAPID*	100	51 17 90BT
		250	51 17 91BT
14 61 30	UNIVERSAL PH	100	51 54 40
		250	51 54 41
14 62 50	PHOSPHATE HR	100	51 19 80
		250	51 19 81
14 64 90	CHLORINE HR (KI)	100	51 30 00
		250	51 30 01
	ACIDIFYING GP	100	51 54 80
		250	51 54 81
	Combi pack#	each 100	51 77 21
	CHLORINE HR (PI)/ACIDIFYING GP	each 250	51 77 22
	Dilution set for sample preparation	1	41 44 70

Material Safety Data Sheets: www.tintometer.com

Comparator 2000+

Colorimeter for regular testing
in **public** pools & spas

Comparator 2000+

With its accessories, the Lovibond® Comparator system 2000 is an extremely versatile, modular system for testing water. It is simple to use yet is uncompromising in terms of precision and reproducibility of results. It is compact and portable. The integrated prism brings the glass standards of the test discs and the coloured sample into the same field of view.

Discs

The required accuracy of results is only ensured if stable, fade-free colour standards are used.

Glass colour standards are fade-free, resistant to chemicals and scratchproof. Lovibond® standards are made from coloured glass filters. They comply with international standards, e.g. ISO 7393/2.

For a selection of the most popular test discs see the table on page 30 onwards.

Cells

We manufacture precision plastic and optical glass cells in line with the highest quality standards. The cells ensure high precision and reproducibility of results.

Lightning unit

We recommend the use of the battery-operated Lovibond® lighting unit in variable lighting conditions. This guarantees uniform lighting conditions, and ensures greater test accuracy.

Testpak

For the most popular tests, discs are available in a Lovibond® TESTPAK. The TESTPAK is a simple and cost-effective means of extending the use of an existing Comparator instrument to a new test parameter.

Order code: 14 20 00 for comparator only.

Each TESTPAK contains the required test disc, tablet reagents (normally for 100 tests), cells and accessories as well as detailed instructions for the desired method.

Please see pages 30 onwards for tests, ranges and reagents

Highlights

- Accurate and reproducible results
- Colour-stable, fade-free glass standards
- In accordance with ISO 7393/2 "Determination of free chlorine and total chlorine"
- Integrated prism

Lighting unit TK 102

Comparator 2000+

Disc with colour-stable glass standards

Test Kits 2000+

Photo: Riviera Pool

Type*	Test Kits	Code
AF 112 A	**Chlorine** 0.1 – 1.0 mg/l Type 3/40 A**	41 11 20
AF 112 B	**Chlorine** 0.2 – 4.0 mg/l Type 3/40 B**	41 11 30
AF 112 J/J	**Chlorine** 0.1 – 2.0 mg/l Type 3/40 J** **pH value** 6.8 – 8.4 Type 2/1 J	41 72 46
AF 116 A	**Chlorine** 0.1 – 1.0 mg/l Type 3/40 A** **pH value** 6.8 – 8.4 Type 2/1 J	41 11 40
AF 116 B	**Chlorine** 0.2 – 4.0 mg/l Type 3/40 B** **pH value** 6.8 – 8.4 Type 2/1 J	41 11 60

Type*	Test Kits	Code
AF 118 S	**Chlorine** 0.1 – 1.0 mg/l Type 3/40 A** **Chlorine** 1.0 – 4.0 mg/l Type 3/40 S** **pH value** 5.2 – 6.8 Type 2/1 G **pH value** 6.8 – 8.4 Type 2/1 J	41 11 81
AF 129	**Water Balance** **Chlorine** 0.2 – 4.0 mg/l Type 3/40 B** **pH value** 6.8 – 8.4 Type 2/1 J **Total Alkalinity-M*** 0 – 500 mg/l $CaCO_3$ Tablet Count Method **Calcium Hardness***** 0 – 1000 mg/l $CaCO_3$ Tablet Count Method	41 12 90

Type*	Test Kits	Code
AF 139	**Sodium Hypochlorite** 2 – 18% Type 3/2 Hypo	41 13 90
AF 405 M	**Municipal Kit** **Chlorine** 0.2 – 4.0 mg/l Type 3/40 B** **pH value** 6.8 – 8.4 Type 2/1 J **Cyanuric Acid***** 20 – 200 mg/l Turbidity Method **Total Alkalinity-M*** 20 – 800 mg/l $CaCO_3$ Speed-Test **Calcium Hardness***** 20 – 800 mg/l $CaCO_3$ Speed-Test	41 40 51

* Disc readings see following pages

** All test kits for chlorine are for "free. combined and total chlorine"

*** Reagents for tablet count method, turbidity method and speed-test see MINIKIT, page 15

Delivery Content

Comparator 2000 +, disc(s), cells, accessories and Lovibond® tablet reagents for 100 measurements each, instruction manual, guarantee sheet in a sturdy plastic case.

Comparator 2000+

Tests, Discs, Testpaks, Reagents, Cells

Comparator 2000+ and Accessories

Type	Item	Code
TK 100	Lovibond® Comparator 2000+	14 20 00
TK 102	Portable lighting unit, battery operated	14 20 50
2000	Daylight Unit 2000, mains operated	17 20 00
AF 631	Water sampler with two 500 ml bottles and one lid	17 05 00
DB 426	Cell stand for 10 cells-13.5 mm, path length	17 02 60
	Glass stirring rod, 12 cm length	36 41 10
	Plastic stirring rod, 13 cm length	36 41 00
	Brush, 11 cm length	38 02 30

Glass Cells

Type	Item	Code
DB424/S	5 glass cells, 13.5 mm path length, calibrated at 2 – 12 ml, with lids	35 42 43
W680/40	Glass cell 40 mm path length, calibrated at 20 ml	60 68 90

Plastic Cells

	5 plastic cells, frosted on two sides, 13.5 mm path length, volume 10 ml, with lid	14 55 05
	10 plastic cells, as 14 55 05	14 55 00
	100 plastic cells, as 14 55 05	14 55 10

Glass cell with lid, volume 10 ml, calibrated 2 - 12 ml, path length 13,5 mm, Pack of 5, code: 35 42 43

Test	Disc	Disc Readings	Range	Code	Testpak
Aluminium	3/127	0; 0.05; 0.1; 0.15; 0.2; 0.25; 0.3; 0.4; 0.5 mg/l	0 - 0.5 mg/l	23 02 05	73 02 05
Ammonia ★	3/112	0; 0.05; 0.1; 0.15; 0.2; 0.25; 0.3; 0.35; 0.4 mg/l	0 - 0.4 mg/l NH_4	23 00 60	73 02 60
Bromine ★	3/53A	0.2; 0.4 ; 0.6; 0.8; 1; 1.2; 1.4; 1.6; 2 mg/l	0.2 - 2 mg/l	23 53 10	73 53 10
	3/53B	1; 2; 3; 4; 5; 6; 7; 8; 10 mg/l	1 - 10 mg/l	23 53 20	73 53 20
	3/53C	0.5; 1; 1.5; 2; 2.5; 3; 4; 5; 6 mg/l	0.5 - 6 mg/l	23 53 30	73 53 30

★ also suitable for seawater, # including stirring rod, 10 cm

Plastic cells, frosted on two sides,
volume 10 ml, path length 13.5 mm, with lids
5 cells - 14 55 05
10 cells - 14 55 00
100 cells - 14 55 10

Reagents	Quantity	Code	Accessories	Code
ALUMINIUM No.1	100	51 54 60	13.5 mm cell, 10ml	35 42 43
	250	51 54 61		
ALUMINIUM No.2	100	51 54 70		
	250	51 54 71		
Combi pack#	each 100	51 76 01		
ALUMINIUM No.1 / No.2	each 250	51 76 02		
AMMONIA No.1	100	51 25 80	40 mm cell W680/40	60 68 90
	250	51 25 81		
AMMONIA No.2	100	51 25 90		
	250	51 25 91		
Combi pack#	each 100	51 76 11		
AMMONIA No.1 / No.2	each 250	51 76 12		
DPD No.1	100	51 10 60BT	13.5 mm cell, 10ml	35 42 43
	250	51 10 61BT		
	500	51 10 62BT		
DPD No.1			13.5 mm cell, 10ml	35 42 43
DPD No.1			13.5 mm cell, 10ml	35 42 43

MSDS (Material Safety Data Sheets): www.tintometer.com

Comparator 2000+

Tests, Discs, Testpaks, Reagents, Cells

Test	Disc	Disc Readings	Range	Code	Testpak
Chlorine ✶ free, combined, total	3/40A	0.1; 0.2; 0.3; 0.4; 0.5; 0.6; 0.7; 0.8; 1 mg/l	0.1 - 1 mg/l	23 40 10	73 40 10
	3/40J	0.1; 0.2; 0.3; 0.4; 0.6; 0.8; 1; 1.5; 2 mg/l	0.1 - 2 mg/l	23 41 40	73 41 40
	3/40B	0.2; 0.4; 0.6; 1; 1.5; 2; 2.5; 3; 4 mg/l	0.2 - 4 mg/l	23 40 20	73 40 20
	3/40K	0.5; 1; 1.5; 2; 2.5; 3; 4; 5; 6 mg/l	0.5 - 6 mg/l	23 39 30	73 39 30
	3/40S	1; 1.2; 1.4; 1.6; 1.8; 2; 2.5; 3; 4 mg/l	1 - 4 mg/l	23 40 90	73 40 90
	3/40P	2; 2.3; 2.5; 2.7; 3; 3.2; 3.6; 4; 5 mg/l	2 - 5 mg/l	23 39 20	73 39 20
	3/40HN	2; 3; 4; 5; 6; 7; 8; 9; 10 mg/l	2 - 10 mg/l	23 40 81	73 40 81
Copper	3/106	0; 0.1; 0.2; 0.3; 0.4; 0.5; 0.6; 0.8; 1 mg/l	0 - 1 mg/l	23 00 50	73 00 50
	3/110	0; 0.5; 1; 1.5; 2; 2.5; 3; 3.5; 4 mg/l	0 - 4 mg/l	23 00 40	73 00 40
Hydrogen Peroxide	3/114	2; 4; 6; 8; 10; 12; 14; 16; 20 mg/l	2 - 20 mg/l	23 00 80	73 00 80
	3/115	10; 20; 30; 40; 50; 60; 70; 80; 100 mg/l	10 - 100 mg/l	23 00 90	73 00 90
Iron ✶	3/116	0.1; 0.2; 0.3; 0.4; 0.5; 0.6; 0.7; 0.8; 1 mg/l	0.1 - 1 mg/l	23 01 00	73 01 00
	3/117	1; 2; 3; 4; 5; 6; 7; 8; 10 mg/l	1 - 10 mg/l	23 01 10	73 01 10
Manganese	3/169	0; 0,5; 1; 1,5; 2; 2,5; 3; 3,5; 4 mg/l	0 - 4,0 mg/l	23 06 90	-------
Nitrate	3/142	10; 20; 30; 40; 50; 60; 70; 80; 100 mg/l	10 -100 mg/l NO_3	23 03 60	-------

✶ also suitable for seawater, # including stirring rod, 10 cm
* alternative reagent, used instead of DPD No.1 in case of turbidity in the water sample caused by high concentration of calcium and/or high conductivity

Reagents	Quantity	Code	Accessories	Code
DPD No.1	100	51 10 60BT	13.5 mm cell, 10ml	35 42 43
	250	51 10 61BT		
	500	51 10 62BT		
DPD No. 1 HIGH CALCIUM*	100	51 57 40		
DPD No.2	100	51 15 30		
	250	51 15 31		
	500	51 15 32		
DPD No.3	100	51 10 80BT		
	250	51 10 81BT		
	500	51 10 82BT		
DPD No.4	100	51 12 20BT		
	250	51 12 21BT		
	500	51 12 22BT		
DPD No.1/2/3/4			13.5 mm cell, 10ml	35 42 43
DPD No.1/2/3/4			13.5 mm cell, 10ml	35 42 43
DPD No.1/2/3/4			13.5 mm cell, 10ml	35 42 43
DPD No.1/2/3/4			13.5 mm cell, 10ml	35 42 43
DPD No.1/2/3/4			13.5 mm cell, 10ml	35 42 43
DPD No.1/2/3/4			5 mm cell W680	60 67 90
COPPER/ZINC LR	100	51 26 20	13.5 mm cell, 10 ml	35 42 43
	250	51 26 21		
COPPER/ZINC HR	100	51 23 40	13.5 mm cell, 10 ml	35 42 43
	250	51 23 41		
HYDROGEN PEROXIDE HR	100	51 35 30	13,5 mm cell, 10ml	35 42 43
	250	51 35 31		
ACIDIFYING PT	100	51 35 40		
	250	51 35 41		
HYDROGEN PEROXIDE HR / ACIDIFYING PT			13,5 mm cell, 10ml	35 42 43
IRON LR	100	51 53 70	13.5 mm cell, 10 ml	35 42 43
	250	51 53 71		
IRON (II) LR	100	51 54 20		
IRON HR	100	51 53 80	13.5 mm cell, 10 ml	35 42 43
	250	51 53 81		
MANGANESE LR 1	100	51 60 80	13,5 mm cell, 10 ml	35 42 43
	250	51 60 81		
MANGANESE LR 2	100	51 60 90		
	250	51 60 91		
Combi pack#	each 100	51 76 21		
MANGANESE LR 1 / LR 2	each 250	51 76 22		
NITRATE No.1	100	51 31 10	13,5 mm cell, 10 ml	35 42 43
	250	51 31 11		
NITRATE No.2	100	51 31 20		
	250	51 31 21		
Combi pack#	each 100	51 76 41		
NITRATE No.1 / No.2	each 250	51 76 42		

MSDS (Material Safety Data Sheets): www.tintometer.com

Comparator 2000+

Tests, Discs, Testpaks, Reagents, Cells

Test	Disc	Disc Readings	Range	Code	Testpak
Ozone	3/67 A	0.01; 0.02; 0.03; 0.04; 0.05; 0.06; 0.07; 0.08; 0.1 mg/l	0.01 - 0.1 mg/l	23 67 10	73 67 10
	3/67	0.1; 0.2; 0.3; 0.4; 0.5; 0.6; 0.7; 0.8; 1 mg/l	0.1 - 1 mg/l	23 67 00	73 67 00
Ozone in presence of chlorine	3/148	0; 0.05; 0.1; 0.15; 0.2; 0.25; 0.3; 0.4; 0.5 mg/l	0 - 0.5 mg/l	23 04 40	73 04 40
pH	2/1G	5.2; 5.4; 5.6; 5.8; 6; 6.2; 6.4; 6.6; 6.8	5.2 - 6.8 pH	22 11 00	72 11 00
	2/1J	6.8; 7; 7.2; 7.4; 7.6; 7.8; 8; 8.2; 8.4	6.8 - 8.4 pH	22 11 30	72 11 30
	2/1P	4; 5; 6; 7; 8; 9; 9,4; 10; 11	4,0 - 11 pH	22 12 20	72 12 20
Phosphate	3/136	0; 5; 10; 15; 20; 25; 30; 35; 40 mg/l	0 - 40 mg/l PO_4	23 03 10	-------
	3/70	0; 10; 20; 30; 40; 50; 60; 70; 80; 100 mg/l	0 - 100 mg/l PO_4	23 70 00	-------
QAC (Quaternary Ammonium Comp.)	3/118	0; 2; 4; 6; 8; 10; 12; 15; 20 mg/l	0 - 20 mg/l	23 01 20	73 01 20
	3/119	0; 20; 40; 60; 80; 100; 120; 150; 200 mg/l	0 - 200 mg/l	23 01 30	73 01 30
Sodium Hypochlorite (NaOCl)	3/2 Hypo	2; 4; 6; 8; 10; 12; 14; 16 %	2 - 16 %	23 21 10	73 21 10

★ also suitable for seawater, # including stirring rod, 10 cm

Certification for Comparator 2000+ Discs

To allow users to demonstrate that test equipment has been assessed for conformance with accepted quality standards, Lovibond® colour discs can be certified by Tintometer Group to conform to ISO 9001. If requested at the time of order, new discs are issued with a serial number and a certificate of conformance stating that the disc has satisfied the relevant inspection criteria and conforms to the requirements of the appropriate test. Depending on the requirements of the user's quality control system, used discs can be returned at regular intervals to Tintometer Group for checking and recertification.

Code	Type of certificate
999800	Certificate for a new test disc
999810	Certificate for a used test disc
999820	Calibration certificate for a new test disc
999830	Calibration certificate for a used test disc

Reagents	Quantity	Code	Accessories	Code
DPD No.4	100 250	51 12 20 51 12 21	40 mm cell W680/40	60 68 90
DPD No.4	100 250	51 12 20 51 12 21	13.5 mm cell, 10 ml	35 42 43
OZONE-INDIGO	100 250	51 31 70 51 31 71	40 mm cell W680/40	60 68 90
BROMOCRESOL PURPLE	100 250	51 17 30 51 17 31	13.5 mm cell, 10 ml	35 42 43
PHENOL RED	100 250	51 17 50 51 17 51	13.5 mm cell, 10 ml	35 42 43
UNIVERSAL PH Indicator	25 ml 100 ml 250 ml 500 ml	45 17 70 45 17 71 45 17 72 45 17 73	13,5 mm cell, 10 ml	35 42 43
PHOSPHATE HR	100 250	51 19 80 51 19 81	13,5 mm cell, 10 ml	35 42 43
PHOSPHATE HR			13,5 mm cell, 10 ml	35 42 43
QAC LR	100 250	51 53 90 51 53 91	40 mm cell W680/40	60 68 90
QAC HR	100 250	51 54 00 51 54 01	13.5 mm cell, 10 ml	35 42 43
CHLORINE HR (KI) Combi pack# CHLORINE HR/ ACIDIFYING GP dillution set NaOCl for sample preparing	100 250 each 100 each 250	51 30 00 51 30 01 51 77 21 51 77 22 41 44 70	13.5 mm cell, 10 ml	35 42 43

MSDS (Material Safety Data Sheets): www.tintometer.com

Water sampler AF 631,
volume 500 ml, total length 85 cm,
Order code: 17 05 00

Ensures water is sampled at the optimum depth.

Photometry

The History

More than three decades have passed since the appearance of the first Lovibond® PC 100 photometer system.

Since that time, Tintometer has become a world-famous name as the manufacturer of photometer systems sold under the brand name of Lovibond®.

Our range of photometer systems extends from the **MiniDirect** in a pocket sized format, **CheckitDirect** for measuring a single parameter, through the **CheckitDirect+** for multiple parameters, to the **SpectroDirect** spectrophotometer.

The multi-functional **PoolDirect** provides the answer to all requirements relating to the analysis of water used in modern swimming pools and baths (see also our swimming pool catalogue).

The **MultiDirect** offers a wide variety of pre-programmed methods and is therefore suitable for the demands of modern water and drinking water analysis.

The latest development from Tintometer involves a photometer system, the mobile laboratory photometer **MaxiDirect** (see general catalogue on page 54).

All the parameters which can be measured with Lovibond® photometer systems are set out in the table. This table also explains what parameters can be measured with which photometer system.

Parameter	MiniDirect	CheckitDirect	CheckitDirect +	PoolDirect	PoolDirect 9 in 1
Alkalinity-M (total)			■	■	■
Aluminium	■	■		■	
Ammonia	■	■		■	
Bromine			■	■	■
Calcium Hardness		■	■	■	■
Chloride		■			
Chlorine	■	■	■	■	■
Chlorine Dioxide	■		■	■	
Copper	■	■	■	■	■
Cyanuric Acid	■		■	■	■
Hydrogen Peroxide				■	
Iodine				■	
Iron (Fe^{2+}, Fe^{3+}), soluble	■	■	■	■	

MiniDirect

CheckitDirect

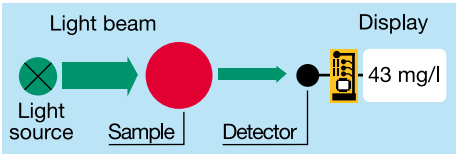
PoolDirect

Parameter	MiniDirect	CheckitDirect	CheckitDirect +	PoolDirect	PoolDirect 9 in 1
Langelier Water Balance System				■	■
Manganese	■	■			
Oxygen, active				■	
Ozone		■		■	■
pH value	■		■	■	■
PHMB (Biguanides)				■	
Phosphate	■	■		■	
Sodium Hypochlorite				■	
Sulphate				■	
Total Hardness		■		■	
Turbidity (nephelometric), see page 70/71		■			
Urea		■	■	■	

The principle

When specific reagents are added, the water sample takes on a degree of coloration that is proportional to the concentration of the parameter being measured. The photometer measures this coloration.

When a light beam passes through the coloured sample, energy with a specific wavelength is absorbed by the test substance. The photometer determines the coloration of the sample by measuring the transmission or absorption of light of this wavelength (in other words, monochromatic light). The photometer then uses a microprocessor to calculate the required concentration and displays the result.



MultiDirect

MaxiDirect

SpectroDirect

MiniDirect Photometer

Reliable Water Testing in a Pocket Sized Format

The MiniDirect is a small, lightweight, handy photometer system with the renowned Lovibond® quality. It uses Lovibond® reagents in the form of tablet reagents or powder packs. These maintain their stability over long periods and guarantee outstanding accuracy. The attractive design is characterised by its clear lines, its user-friendliness and ergonomics. Reading test results is child's play, thanks to the illuminated display on keypress. And because it is waterproof, the MiniDirect can be used outdoors in any circumstances.

N.I.S.T Traceability

The MiniDirect has a factory calibration, which is related to internal standards which are not N.I.S.T traceable. The instrument may be calibrated by the user in a "user calibration mode" with N.I.S.T traceable standards.

(N.I.S.T. = National Institute of Standards and Technology)

Please see pages 52 onwards for tests, ranges and reagents

Highlights

- Waterproof electronics
- Real-Time Clock and Date
- Memory for 16 data sets
- Illuminated Display
- Approx. 200 g weight
- Highest accuracy
- Calibration Mode

Single Parameter

Test	Code
Aluminium, with tablet reagents 0.05 - 0.3 mg/l Al	27 00 70
Aluminium, with powder reagents 0.01 - 0.25 mg/l Al	27 00 75
Ammonia, with tablet reagents 0.02 - 1.0 mg/l N	27 00 50
Ammonia, with powder reagents 0.01 - 0.8 mg/l N (50 tests)	27 00 55
Chlorine, with tablet reagents 0.01 - 6.0 mg/l Cl	27 00 00
Chlorine, with powder reagents 0.01 - 2.0 mg/l Cl	27 00 05
Chlorine, with tube test 0.01 - 2.0 mg/l Cl	27 00 10
Chlorine dioxide, with tablet reagents 0.01 - 3.8 mg/l ClO_2	27 01 30
Chlorine dioxide, with powder reagents 0.01 - 3.8 mg/l ClO_2	27 01 35
Copper, with tablet reagents 0.05 - 5.0 mg/l Cu	27 01 10
Copper, with powder reagents 0.05 - 5.0 mg/l Cu	27 01 15
Iron, with tablet reagents 0.02 - 1.0 mg/l Fe	27 00 80
Iron, with powder reagents 0.05 - 1.8 mg/l Fe	27 00 84
Iron, with powder reagents 0.02 - 5.0 mg/l Fe	27 00 85
Manganese HR, with powder reagents 0.1 - 20 mg/l Mn	27 01 05
Phosphate, with tablet reagents 0.1 - 4.0 mg/l PO_4	27 00 60
Phosphate, with powder reagents 0.05 - 2.5 mg/l PO_4	27 00 65

Multi Parameter

Test	Code
Chlorine, pH, with tablet reagents 0.01 - 6.0 mg/l Cl ; 6.5 - 8.4 pH	27 30 00
Chlorine, pH, with powder for chlorine 0.01 - 2.0 mg/l Cl ; 6.5 - 8.4 pH	27 30 05
Chlorine, pH, Cyanuric acid with tablet reagents 0.01 - 6.0 mg/l Cl ; 6.5 - 8.4 pH 2 - 160 mg/l Cyanuric acid	27 30 10

Delivery content

Each MiniDirect is delivered in a plastic case, including 9 V battery, 3 round vials with lid, reagents for 100 tests, spares, guarantee sheet, certificate and instruction manual.

You can find updated information on parameters and measuring ranges on our website at www.tintometer.com

Please see pages 52 onwards for tests, ranges and reagents

Technical data

Optics	temperature compensated LED and photo sensor amplifier
Power supply	9 V power pack battery providing 40 hours operation
Auto-off	automatic switch off
Display	backlit LCD (on keypress)
Storage	internal ring memory for 16 data sets
Additional feature	real time clock and date
Calibration	factory calibration and user calibration. Reset to factory calibration possible
Housing	water proof
Dimensions (L x W x H)	170 x 65 x 45 mm
Weight	approx. 200 g
Environmental conditions	temperature: 0 – 40°C rel. humidity: 30 – 90%, not condensing
CE	EN 50081-1 VDE 0839 part 81-1:1993-3 EN 50082-2 VDE 0839 part 82-2:1996-02

Accessories

Item	Code
Set of 12 round vials with lid Height 48 mm, Ø 24 mm	19 76 20
Set of 12 **multy vials** with lid Height 48 mm, Ø 24 mm 10 mm path length	19 76 10
Adapter for round vial, ø 16 mm	19802220
Sealing rings for round vial, ø 24 mm (12 pc.)	19 76 26
Cleaning cloth for vials	19 76 35
Protection lid	19801796
Cleaning set for sample chamber	12 40 60
Measuring beaker, 100 ml	38 48 01
Plastic funnel with handle	47 10 07
Brush, 11 cm length	38 02 30
Plastic stirring rod, 13 cm length	36 41 00
Plastic stirring rod, 13 cm (pack of 10)	36 41 20
9 V-battery	19 50 01 2

Reference Standard Kits

The reference standards are designed to check the accuracy and the reliability of the results.

The shelf life of reference standards is two years from the date of production, provided that storage and use are in accordance with the instructions provided.

Kit Chlorine Tablet Test 0.2* and 1.0* mg/l	27 56 00
Kit Chlorine Tablet Test 0.5* and 2.0* mg/l	27 56 05
Kit Chlorine Powder Reagent Test (VARIO) 0.2* and 1.0* mg/l	27 56 01
Kit Chlorine Tube Test 0.2* and 1.0* mg/l	27 56 02
Kit pH	27 56 10

* Approximate figure, actual figure specified in Certificate of Analysis

CheckitDirect Photometer

A versatile range of portable photometers for the pool and spa water treatment

Please see pages 52 onwards for tests, ranges and reagents

Highlights

- Waterproof electronics
- Automatic Switch-Off
- Real-Time Clock and Date
- Calibration Mode
- Illuminated Display
- Memory for 16 data sets

The microprocessor-controlled CheckitDirect photometers are pre-programmed for specific test methods and factory-calibrated. The CheckitDirect units supply accurate, reproducible results very quickly.
Other major advantages include ease of operation, ergonomic design, compact dimensions and safe handling.

The tests are conducted using either Lovibond® tablet reagents with long-term stability and a guaranteed minimum 5 or 10 year shelf life, with VARIO Powder Packs or using Lovibond® liquid reagents.

N.I.S.T Traceability

The instruments have a factory calibration, which is related to internal standards which are not N.I.S.T traceable. The instrument may be calibrated by the user in a "user calibration mode" with N.I.S.T traceable standards.
(N.I.S.T. = National Institute of Standards and Technology)

Calibration certificate

Beside the "Certificate of Compliance" which is supplied with each CheckitDirect, calibration certificates are available at cost on request. Calibration certificates are individually supplied per instrument and per method.

The Calibration Certificate has to be ordered together with the new instrument and cannot be delivered at a later stage.

Delivery Content

Each CheckitDirect is supplied in a case complete with 9 V battery, 3 round vials with cap, tablets and/or liquid reagents or VARIO Powder Packs, accessories, instruction manual, guarantee sheet and a certificate of compliance.

Accessories

Item	Code
Set of 12 round vials with cap Height 48 mm, Ø 24 mm	19 76 20
Set of 12 round vials with cap Height 90 mm, Ø 16 mm	19 76 65
Adapter for round vials Ø 16 mm	19 80 10 94
Cleaning cloth for vials	19 76 35
Lid for adapter	19 80 11 00
Cleaning set for sample chamber	12 40 60
Measurement beaker, 100 ml	38 48 01
Plastic funnel with handle	47 10 07
Plastic stirring rod, 13 cm length	36 41 00
Plastic stirring rod , 10 cm length	36 41 09
Battery lid with accessories	19 80 11 63
9 V-battery	19 50 01 2

Technical data

Optics	temperature-compensated LEDs and photosensor amplifier in water proof sample chamber
Power supply	9 V powerpack battery providing 40 hours operation
Auto - OFF	automatic switch-off
Display	backlit LCD (on keypress)
Storage	internal ring memory for 16 data sets
Additional feature	real time clock and date
Calibration	factory calibration and user calibration. Reset to factory calibration possible
Dimensions (L x W x H)	190 x 110 x 55 mm
Weight	0.4 kg (base unit)
Environmental conditions	Temperature: 0 – 40 °C rel. humidity: 30 – 90% (non condensing)
CE-conformity	DIN EN 50081-1 VDE 0839 part 81-1: 1993-03 DIN EN 50082-2 VDE 0839 part 82-2: 1996-02

Reference Standard Kits

The reference standards are designed to check the accuracy and the reliability of the results.

The shelf life of reference standards is two years from the date of production, provided that storage and use are in accordance with the instructions provided.

Kit Chlorine Tablet/Liquid Test 0.2* and 1.0* mg/l	20 56 00
Kit Chlorine Tablet/Liquid Test 0.5* and 2.0* mg/l	20 56 05
Kit Chlorine Powder Reagent Test (VARIO) 0.2* and 1.0* mg/l	20 56 40
Kit pH Tablet/Liquid Test	20 56 10

* Approximate figure, actual figure specified in Certificate of Analysis

Please see pages 52 onwards for tests, ranges and reagents

CheckitDirect +

Each CheckitDirect + is programmed for **several** test methods

Please see pages 52 onwards for tests, ranges and reagents

Test	λ (nm)	Display	Range	Resolution	Method
Alkalinity, Total-M	605	$CaCO_3$	5 – 200 mg/l	1.0 mg/l	Alka-M-Photometer
Bromine ★	528	Br	0.1 – 13.5 mg/l	0.01 mg/l	DPD No.1
Calcium Hardness	605		50 – 500 mg/l	1.0 mg/l	Calcio
Chlorine ★ free, combined**, total	528	Cl_2	0.01 – 6 mg/l	0.01 mg/l	DPD No.1/No.3 Tablet Reagents
Chlorine free, combined**, total	528	Cl_2	0.01 – 4 mg/l	0.01 mg/l	DPD- Liquid Reagents
Chlorine ★ free, combined**, total	528	Cl_2	0.01 – 2 mg/l	0.01 mg/l	VARIO DPD Powder Free/Total Chlorine***
Chlorine HR	470	Cl_2	5 – 200 mg/l	1.0 mg/l	Acidifying GP/Chlorine HR
Chlorine Dioxide ★	470	ClO_2	0.1 – 11 mg/l	0.01 mg/l	DPD No.1
Copper	528	Cu^{2+}	0.05 – 5 mg/l	0.01 mg/l	Copper No.1/No.2
Cyanuric Acid	528	Cys	2 – 160 mg/l*	1.00 mg/l	Cyanuric Acid
Iron	528	$Fe^{2+/3+}$	0.02 – 1 mg/l	0.01 mg/l	Iron LR
pH-Value	528	pH	6.5 – 8.4 pH	0.01 pH	Phenolred Photometer
Urea	660	CH_4N_2O	0.1 – 6 mg/l	0.1 mg/l	Urease 1/2 AMMONIA No.1/No.2

* by 1 : 1 sample dilution
** may be calculated by deducting the value free- from total chlorine
*** VARIO DPD-Powder is also suitable for use with Hach-Photometers
★ also suitable for seawater

Variations

Item	Determination	Code
2 in 1	**Chlorine, pH-value**[1)]	20 89 40
2 in 1	**Chlorine, pH-value** with VARIO DPD Free/Total Chlorine (Powder)	20 99 60
2 in 1	**Copper, pH-value**[1)]	20 72 30
3 in 1	**Chlorine, pH-value, Bromine**[1)]	20 61 80
3 in 1	**Chlorine Dioxide, Chlorine LR, HR**[1)]	20 88 00
3 in 1	**Chlorine, pH-value Alkalinity, total (M)**[1)]	20 89 00
3 in 1	**Chlorine, pH-value, Alkalinity, total (M)**[2)]	20 89 30

Item	Determination	Code
3 in 1	**Chlorine, pH-value, Cyanuric Acid**[1)]	20 60 10
3 in 1	**Chlorine, pH-value, Cyanuric Acid**[2)]	20 82 00
4 in 1	**Chlorine, pH-value, Cyanuric Acid, Alkalinity, total (M)**[1)]	20 60 50
4 in 1	**Chlorine, pH-value, Cyanuric Acid, Alkalinity, total (M)**[2)]	20 60 54
4 in 1	**Chlorine, pH-value, Cyanuric Acid, Urea**[1)]	20 92 20
4 in 1	**Chlorine, pH-value, Alkalinity, total (M), Urea**[1)]	20 62 90

Item	Determination	Code
5 in 1	**Chlorine, pH-value, Cyanuric Acid, Alkalinity, total (M), Calcium Hardness**[1)]	20 61 20
5 in 1	**Chlorine, pH-value, Cyanuric Acid, Alkalinity, total (M), Iron**[1)]	20 62 40
6 in 1	**Chlorine, pH-value, Cyanuric Acid, Alkalinity, total (M), Calcium Hardness, Bromine**[1)]	20 61 90
6 in 1	**Chlorine, pH-value, Cyanuric Acid, Alkalinity, total (M), Copper, Iron**[1)]	20 62 10

1) with **tablet reagents** for chlorine and pH
2) with **liquid reagents** for chlorine and pH

Reference standard kits see page 41

CheckitDirect

Each CheckitDirect is
programmed for **one** test method

Test	λ (nm)	Display	Range	Resolution	Method	Code
Aluminium	528	Al	0.05 – 0.3 mg/l	0.01 mg/l	ALUMINIUM No.1 / No.2	20 64 00
Ammonia ★	660	NH_4-N	0.02 – 1 ; 0.2 – 10 mg/l*	0.01 mg/l	AMMONIA No.1 / No.2	20 65 00
Chlorine DPD free, combined, total ★	528	Cl_2	0.05 – 6 mg/l	0.01 mg/l	DPD No.1/No.3/No.4 tablet reagents	20 69 00
Chlorine DPD free, combined, total	528	Cl_2	0.05 – 4 mg/l	0.01 mg/l	DPD Liquid Reagents	20 70 00
Chlorine PP free, combined ★	528	Cl_2	0 .01– 2 mg/l	0.01 mg/l	VARIO DPD Free/Total Chlorine Powder Packs (PP)	20 99 50
Chloride ★	528	Cl^-	0.5 – 25 ; 5 – 250 mg/l*	0.01 mg/l	CHLORIDE T1 / T2	20 68 00
Copper ★	528	Cu^{2+}	0.05 – 5 mg//l	0.01 mg/l	COPPER No.1 / No.2	20 72 00
Hardness, total	528	$CaCO_3$	50 – 500 mg/l	0.1 / 1.0 mg/l	HARDCHECK	20 80 10
Iron ★	528	$Fe^{2+/3+}$	0.02 – 1 ; 0.2 – 10 mg/l*	0.01 mg/l	IRON LR	20 74 00
Manganese	430	Mn	0.05 – 4 mg/l	0.01 mg/l	MANGANESE LR 1 / LR 2	20 94 00
Ozone (Indigo) ★	605	O_3	0.05 – 0.5 mg/l	0.01 mg/l	OZONE	20 77 00
Phosphate HR ★	470	PO_4^{3-}	10 – 100 mg/l	0.1 mg/l	PHOSPHATE HR P1/P2	20 78 00
Turbidity	875	NTU	0.1–2000 NTU - FNU - TE/F		No reagents required	20 60 20
Urea	660	CH_4N_2O	0.1 – 3 ; 0.2 – 6 mg/l*	0.01 mg/l	UREA-Reagent 1/2 AMMONIA No.1 / No.2	20 85 00

* High range by dilution
★ also suitable for seawater

Reference standard kits see page 41

Please see pages 52 onwards for tests, ranges and reagents

PoolDirect Photometer

Alkalinity, total (M)
Aluminium
Ammonia
Bromine
Calcium hardness
Chlorine
Chlorine dioxide
Copper
Cyanuric acid
Hardness, total
Hardness, calcium
Hydrogen peroxide
Iron
Iodine
Langelier Saturation Index
Oxygen, active
Ozone
pH
PHMB (Biguanide)
Phosphate
Sulphate
Sodium Hypochlorite
Urea
Water Balance

Highlights

- A wide range of pre-programmed methods
- Long-term stable LEDs as light sources
- Water Balance Calculation
- Update of new methods and languages via Internet
- Interface
- Memory for 1000 data sets

This contemporary, multi-parameter photometer caters for the full range of water testing requirements experienced by modern swimming pools. Various national laws and standards and international regulations make high demands on the practicability of the testing unit as well as on the accuracy of results.

The PoolDirect enables swimming pool and spa operators to measure all the relevant parameters for assessing pool water quality rapidly, reliably and with optimum precision.

A large graphic display, a choice of several different languages (German, English, French, Spanish, Italian) and user-friendly operating instructions make the device extremely easy to use.

Delivery Content

The unit is equipped and ready to use for: Chlorine (free, combined, total) 0.02-6.0 mg/l, pH 6.8-8.4, cyanuric acid 1-160 mg/l.
Inclusive of all accessories such as tablet reagents for 100 tests, 3 sample vials, instruction manual, etc., in carrying case.

Order code: 21 30 70 (U.K. version)

Order code: 21 30 05 (**basic version**) with batteries instead of rechargeable batteries, without mains charger and PC connection cable

Order code: 21 30 10 (International version)

Order code: 21 30 00 (German version)

Please see pages 52 onwards for tests, ranges and reagents

Technical data

Display	Graphic-display
Optics	3 temperature compensating LED, internal reference channel, photodiode in protected sample chamber
Wavelengths	3 interference filters in one unit, λ_1 = 530 nm IF $\Delta\lambda$ (nm) = 5 λ_2 = 560 nm IF $\Delta\lambda$ (nm) = 5 λ_3 = 610 nm IF $\Delta\lambda$ (nm) = 6 IF = Interference filter
Interface	RS232 for printer and PC-connection
Download	Software and methods update by means of the internet
Operation	Acid and solvent resistant, touch-sensitive keypad with audible feedback
Power Supply	7 Ni-MH-battery pack (AA/Mignon), charged whilst in the unit with external mains charger, integrated overload cut-out
Dimensions (L x W x H)	265 x 195 x 70 mm
Weight (unit)	approx. 1000 g with rechargeable batteries
Ambient Conditions	up to max. 90 % humidity (non condensing) approx. 5–40 °C
Auto-Off	approx. 20 minutes after last keypress with no loss of data
Auto-Check	By pressing ON/OFF-key
Memory Capacity	approx. 1000 data sets with date, time and registration number
Approval	CE

Accessories

Item	Code
Set of 12 round vials with cap Height 48 mm, Ø 24 mm	19 76 20
Sealing ring for vials ø 24 mm (12 pc.)	19 76 26
Cleaning cloth for vials	19 76 35
Plastic beaker, 100 ml	38 48 01
Plastic stirring rod, 13 cm length	36 41 00
Cleaning brush, 10 cm	38 02 30
Syringe, plastic, 2 ml	36 90 80
Syringe, plastic, 5 ml	36 61 20
Syringe, plastic, 10 ml	36 90 90
Rubber seal cap	19 80 15 01
Mains charger, 100 - 240 V, 50 - 60 Hz, TI connector	19 20 55
Mains charger, as 19 20 55, with UK connector	19 20 45
Mains charger, as 19 20 55, with USA/Japan connector	19 20 46
Mains charger, as 19 20 55, with Australia connector	19 20 47
Connection cable for connection PC, serial 9-pins	19 81 98
Ni-MH Accu AA Mignon, 1100 mAh (7 pc.)	19 50 02 0
Lithium battery	19 50 01 7
Paper printer DPN 2335	19 80 75

Reference Standard Kits

The reference standards are designed to check the accuracy and the reliability of the results.

The shelf life of reference standards is two years from the date of production, provided that storage and use are in accordance with the instructions provided.

Reference Standard Kit Chlorine 21 56 00
0.2* and 1.0* mg/l, for tablet and VARIO methods

Reference Standard Kit Chlorine 21 56 05
0.5* and 2.0* mg/l, for tablet methods only

Reference Standard Kit pH 21 56 10

* Approximate figure, actual figure specified in Certificate of Analysis

Verification Standard Kit

The Verification standard kit for the PoolDirect is designed to reassure the user about the accuracy and the reliability of the results.
The shelf life of the Verification standard kit is two years from the date of production, provided that storage and use are in accordance with the instructions provided.

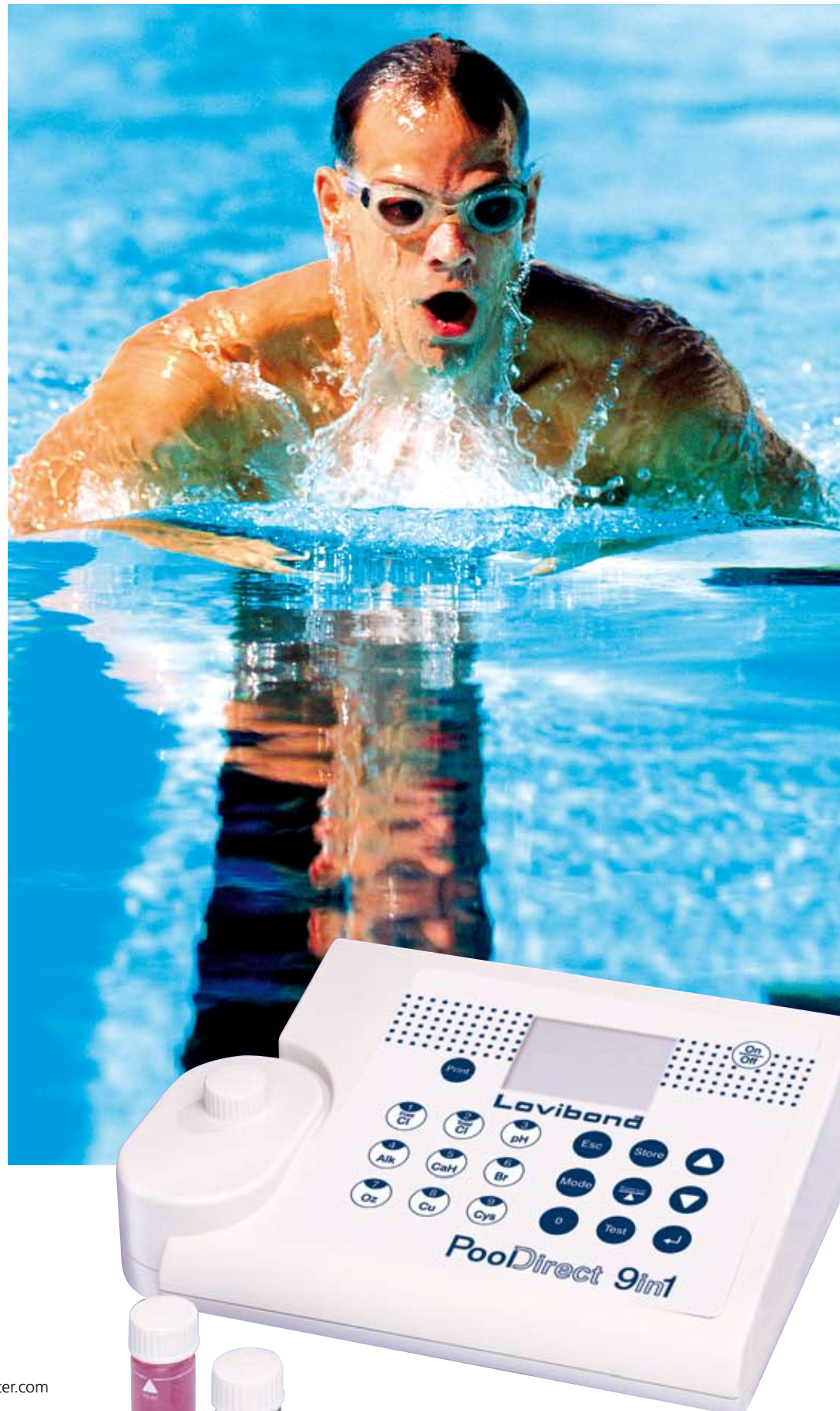
Verification Standard Kit **21 56 60**

PoolDirect 9 in 1 Photometer

with single key parameter selection

Alkalinity-M
Bromine
Calcium Hardness
Chlorine
Copper
Cyanuric Acid
Langelier-
Saturation-Index
Ozone
pH-value
Water Balance

Proven Optical
System with Dual
Beam Technology



The 9in1 instrument is designed to provide the highest standards required by today's Pool Managers delivering Accurate, Reliable and Consistent results to control and manage swimming pool water quality. The single button selection of pre-programmed tests combined with on-screen instructions makes the 9in1 ideal for the professional and occasional user. Langelier, or balanced water calculations are often neglected as they are seen as a complex formula with many variables but the 9in1 changes all that. With its Langelier calculator button the formula has been tamed! Just enter the elements of the formula as prompted and the 9in1 will calculate the Balanced Water Index for you.The rugged construction and splash resistance of the 9in1 make it ideal for use at the poolside or in the plant-room.

Technical data and accessories

identical with PoolDirect, see page 47

Delivery Content

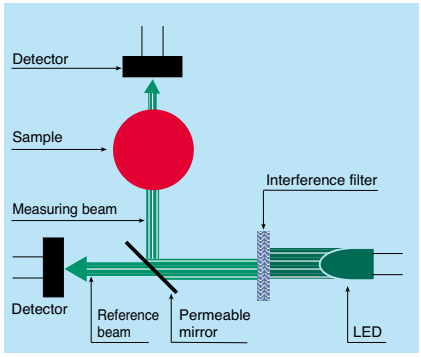
9in1 Photometer, Reagents for all 9 parameters (100 tests), mains adaptor, rechargeable batteries, cable for computer use, 3 test vials, stirring rod, instruction manual.

Order code: 21 20 50 (German version)

Order code: 21 20 55 (basic version)
with batteries instead of rechargeable batteries, without mains charger and PC connection cable

Order code: 21 20 60 (international version)

Optics



Twin light-beam technology guarantees optimum precision with PoolDirect photometers.

With this system, the wavelength of a light beam is generated by an LED and fine-tuned through an interference filter. This light beam is then split via a semi-transparent mirror into a measurement beam and a reference beam.

The light intensity of these two beams is measured by two different detectors. The reference beam strikes the detector directly, while the measurement beam first passes through the sample, before it strikes the second detector.

The measurement figure is arrived at by calculating the difference in light intensity of the two beams and this means that only the absorption in the sample is measured. Any interference factors are automatically eliminated.

Please see pages 52 onwards for tests, ranges and reagents

Reference Standard Kits

The reference standards are designed to check the accuracy and the reliability of the results.

The shelf life of reference standards is two years from the date of production, provided that storage and use are in accordance with the instructions provided.

Reference Standard Kit Chlorine 21 56 20
0.2* and 1.0* mg/l

Reference Standard Kit Chlorine 21 56 25
0.5* and 2.0* mg/l

Reference Standard Kit pH 21 56 15

* Approximate figure, actual figure specified in Certificate of Analysis

Verification Standard Kit

The Verification standard kit for the PoolDirect 9 in 1 is designed to reassure the user about the accuracy and the reliability of the results.
The shelf life of the Verification standard kit is two years from the date of production, provided that storage and use are in accordance with the instructions provided.

Verification Standard Kit **21 56 60**

Tests	λ (nm)	Display	Range	Resolution	Method
Alkalinity, Total-M	610	$CaCO_3$	5 – 200 mg/l	1.0 mg/l	Acid/Indicator
Bromine	530	Br	0.05 – 13 mg/l	0.01 mg/l	DPD
Chlorine (free)	530	Cl_2	0.02 – 6 mg/l	0.01 mg/l	DPD
Chlorine (total)	530	Cl_2	0.02 – 6 mg/l	0.01 mg/l	DPD
Copper	560	Cu^{2+}	0.05 – 5 mg/l	0.01 mg/l	Biquinoline
Cyanuric acid	530	Cys	2 – 160 mg/l*	1.00 mg/l	Melamine
Hardness, Calcium	560	$CaCO_3$	50 – 900 mg/l	1.0 mg/l	Murexide
Ozone	530	O_3	0.02 – 1 mg/l		DPD/Glycine
pH-Value	560	pH	6.5 – 8.4 pH	0.01 pH	Phenolred

Highlights

- Pre-programmed methods
- Long-term stable LEDs as light sources
- Water Balance Calculation
- Interface
- Memory for 1000 data sets

Reagents

History

For more than thirty years, Tintometer in Dortmund has been manufacturing reagents for water testing and marketing these reagents around the world under the brand name Lovibond®.

Different forms of reagents are required for different fields of application. It is fair to say that, in terms of quality, tablet reagents are the best form of reagent. Thanks to production techniques of the type used in the pharmaceutical industry and stringent internal quality standards, Tintometer is able to produce tablet reagents for water testing with a guaranteed shelf life of 5 or 10 years. These tablets are individually sealed in high-grade, polyethylene-coated aluminium foil and represent the reagent form of choice for everyday water testing applications.

Users in different countries traditionally prefer forms of reagent other than tablets. Lovibond® powder reagents are designed to allow fast and easy testing.

Powder reagents are packed in aluminium foil for a wide range of applications and producers represent an alternative reagent form recently introduced by Tintometer.

Last but not least, liquid reagents are indispensable for many testing tasks. Testing for substances that are hard to detect, for parameters like total nitrogen, or for the aggregate parameter COD, require the use of a wide range of reagents in a form that permits more "aggressive" sample processing. The Lovibond® programme is rounded off by reagent tests and tube tests, making Tintometer GmbH the only reagent producer in the world that offers a complete range of reagent forms.

DPD Reagents

DPD reagents are offered by different manufacturers.

For quality reasons, users should validate the products prior to use.

DPD reagents are produced on the basis of international standard methods, e.g. ISO 7393/2. The chemicals are of crystalline **white** nature. If a reagent (tablets or powder) is **not white** but has turned to grey/brownish or purple colours, it has deteriorated. DPD liquid reagents which should be colourless when fresh, may turn into brownish colour if the reagent has deteriorated. The use of such degraded products must be avoided as they will give false results.

Tablets

Our test tablets are manufactured in Germany under tightly controlled conditions on the latest machinery.

Maintaining the highest quality standards permits Tintometer GmbH to guarantee our reagent tablets for a minimum of 5 years, and some for as long as 10 years.

We can make this promise because each tablet is hermetically sealed within an individual aluminium foil pocket, protecting against challenging environmental conditions. This packaging keeps each tablet in perfect condition, right up until the time it is needed by the user.

Test tablets remain the most consistent and reliable reagent format available, consistently outperforming other reagent formats, and delivering maximum accuracy for the user.

Now we have improved even further on this highly successful format. To the tight quality control processes, integral to Lovibond®'s tablet manufacture, and the simple test procedures, we have added new blister packaging.

Our new aluminium foil blister packaging brings added convenience to the tradition of protection achieved in Lovibond®'s long established tablet production technology.

With the new blister strip, the user just pushes the tablet through the protective foil, straight into the sample. Simple, time-saving and practical.

This type of packaging, long established in pharmaceutical applications, combines all the advantages of protective foil, with convenience for the user.

Each tablet is contained within an individually formed foil cup, lined with the latest aluminium composite material, and guaranteeing product performance.

As a result of improved sealing efficiency, the blister pack has been reduced in size to 91 x 34mm making them even more convenient for storage and shipping.

'BT' is added to the end of the code to identify the new style of packaging. (For example – 511060BT).

There are no safety risks if the tablets are used in line with the instructions supplied.
Safety data sheets are available for all reagents.

Specifications and Certificate of Analysis

To express the high quality standard of Lovibond® tablet reagents, specifications for each type of tablet as well as a "Certificate of Analysis" for each lot is available in the down-load area at www.tintometer.com.

Liquids

As a rule, liquid reagents do not consist of a single preparation but comprise several components that need to be added to the sample in a certain order. As both the size and the number of drops have a decisive effect on the resultant colour complex, the reagents need to be added with a high degree of precision.

The useful life of liquid reagents is reduced by temporary contact with oxygen in the air when the bottle is opened as well as by unsuitable storage environments (presence of sunlight or high temperatures). Provided that the bottles are stored within the temperature range +6°C to +10°C, the Lovibond® DPD and Phenol Red solutions can be used for a period of one year from the production date.

Tube test – Chlorine

Lovibond® chlorine tube tests enable the user to easily perform highly sensitive and precise water testing.

The tube test contains a precisely measured amount of reagent, thereby avoiding the presence of superfluous chemicals and optimising test safety.

The tubes are made of special optical glass with a 16 mm in diameter. They are supplied in a storage and dispatch box together with the digestion or auxiliary reagents. This packaging unit contains 50 reaction vials and one zero vial for MiniDirect photometer calibration.

VARIO Powder Packs

The fast and easy use of VARIO Powder Packs has made them extremely popular for water testing applications in many countries throughout the world.

The Lovibond® Powder Pack programme provides more experienced users with a real alternative to existing measurement systems.

The Vario Powder Packs are produced to the same high quality standards that have made Tintometer's tablet reagents so successful for several decades.

Parameters from aluminium and chlorine through to sulphate are just some of the well-known tests that are included in the VARIO Powder Pack range.

Their chemical properties is suitable also for use with Hach-Photometer-Systems.

Determination of Chlorine, Chlorine Dioxide, Bromine and Ozone with Lovibond® Tablet Reagents

Free Chlorine	▶	DPD No.1-Tablet (direct reading of the value)
Combined Chlorine	▶	DPD No.1-Tablet (free Chlorine = A) + DPD No.3-Tablet (total Chlorine = B) Difference between B and A = **Combined Chlorine**
Total Chlorine	▶	DPD No.4-Tablet (direct reading of the value) or DPD-Tablets No.1 and No.3 together
Monochloramine Dichloramine	▶	DPD No.1-Tablet (free Chlorine = A) + DPD No.2-Tablet (Result = C) Difference between C and A = **Monochloramine** + DPD No.3-Tablet (Result = B) Difference between B and C = **Dichloramine**
Chlorine Dioxide and Chlorine Dioxide in presence of Residual Chlorine	▶	DPD No.1-Tablet and DPD No. 3-Tablet Glycine-Tablet Acid-Tablet Neutralising-Tablet
Bromine	▶	DPD No.1-Tablet
Ozone	▶	Indigo-Tablet or DPD No.4-Tablet (depends on the method)
Ozone in presence of Chlorine	▶	Indigo-Tablet

Reagents

Test	Range	Wavelength λ / nm MiniDirect	CheckitDirect	CheckitDirect+	PoolDirect	PoolDirect 9 in 1	Method	Cuvette
Acid Capacity $K_{S4.3}$ Tablets	0.1 - 4 mmol/l	-	-	605	610	-	Acid/Indicator [1, 2]	24 mm ø
Alkalinity-m (total) Tablets	5 - 200 mg/l	-	-	605	610	610	Acid/Indicator [1, 2, 5]	24 mm ø
Aluminium VARIO Powder reagent	0.01 - 0.25 mg/l	528	-	-	530	-	Eriochrome cyanine R [2]	24 mm ø
Aluminium Tablets	0.01 - 0.3 mg/l 0.05 - 0.3 mg/l	- 528	- 528	- -	530 -	- -	Eriochromecyanine R [2]	24 mm ø
Ammonia Tablets	0.02 - 1 mg/l 0.2 - 10 mg/l [i)]	660 -	660 660	- -	610 -	- -	Indophenole blue [2, 3]	24 mm ø
Ammonia VARIO Powder reagent	0.01 - 0.8 mg/l	660	-	-	-	-	Salicylate [2]	24 mm ø
Biguanide (see PHMB)								
Bromine Tablets	0.05 - 13 mg/l 0.02 - 13.5 mg/l	- -	- -	- 528	530 -	530 -	DPD [5]	24 mm ø 24 mm ø
Chlorine [a)] Tablets	0.01 - 6 mg/l	528	528	528	530	530	DPD [1, 2]	24 mm ø
Chlorine [a)] Liquid reagent	0.01 - 4 mg/l 0.02 - 3 mg/l	-	528	528	530	-	DPD [1, 2]	24 mm ø

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[4] Photometrische Analyse, Lange/Vejdelek, Verlag Chemie; 1980
[5] Colorimetric Chemical Analytical Methods, 9th Edition, Lovibond®

Display	Reagent	Form of reagent/Quantity	Order code
	ALKA-M-PHOTOMETER	Tablet / 100	51 32 10
$CaCO_3$	ALKA-M-PHOTOMETER	Tablet / 100	51 32 10
Al	VARIO Aluminum ECR/F20	Powder Pack / 100	
	VARIO Aluminum Hexamine/F20	Powder Pack / 100	
	VARIO Aluminum ECR Masking Reagent	Liquid reagent / 25 ml	
		Set	53 50 00
Al	ALUMINIUM No. 1	Tablet / 100	51 54 60
	ALUMINIUM No. 2	Tablet / 100	51 54 70
	Combi pack# ALUMINIUM No.1 / No.2	each 100	51 76 01
	Combi pack# ALUMINIUM No.1 / No.2	each 250	51 76 02
N	AMMONIA No. 1	Tablet / 100	51 25 80
	AMMONIA No. 2	Tablet / 100	51 25 90
	Combi pack# AMMONIA No.1 / No.2	each 100	51 76 11
	Combi pack# AMMONIA No.1 / No.2	each 250	51 76 12
	Ammonia conditioning powder (for seawater)	Powder / 15 g / 100 tests	46 01 70
N	VARIO Ammonia Salicylate F10	Powder Pack / 100	
	VARIO Ammonia Cyanurate F10	Powder Pack / 100	
		Set	53 55 00
Br	DPD No. 1	Tablet / 100	51 10 60 BT
	DPD No. 1 HIGH CALCIUM [e]	Tablet / 100	51 57 40
Cl_2	DPD No. 1	Tablet / 100	51 10 60 BT
	DPD No. 3	Tablet / 100	51 10 80 BT
	Combi pack# DPD No.1 / No.3	each 100	51 77 11
	Combi pack# DPD No.1 / No.3	each 250	51 77 12
	DPD No. 1 HIGH CALCIUM [e]	Tablet / 100	51 57 40
Cl_2	DPD 1 Buffer solution	Liquid reagent / 15 ml	47 10 10
	DPD 1 Reagent solution	Liquid reagent / 15 ml	47 10 20
	DPD 3 Solution	Liquid reagent / 15 ml	47 10 30
		Set	47 10 56

[a] determination of free, combined and total
[b] Reactor is necessary for COD (150°C), TOC (120°C) and total -chromium, - phosphate, -nitrogen, (100°C)
[c] MultiDirect/PoolDirect: Adapter is necessary for Vacu-vials® (Order code 19 20 75)
[d] Spectroquant® is a Merck KGaA Trademark
[e] alternative reagent, used instead of DPD No.1 in case of turbidity in the water sample caused by high concentration of calcium and/or high conductivity
[f] additionally required for determination of chlorine dioxide / ozone in the presence of chlorine
[g] Reagent recovers most insoluble iron oxides without digestion
[h] additionally required for samples with hardness values above 300 mg/l $CaCO_3$
[i] high range by dilution
[#] no BT blister tablets, including stirring rod, 10 cm

Reagents

Test	Range	Wavelength λ / nm MiniDirect	CheckitDirect	CheckitDirect+	PoolDirect	PoolDirect 9 in 1	Method	Cuvette
Chlorine VARIO [a)] Powder reagent	0.01 - 2 mg/l	528	528	528	530	-	DPD [1, 2]	24 mm ø
Chlorine HR (KI) Tablets	5 - 200 mg/l	-	470	470	-	-	KI / Acid [5]	16 mm ø
Chlorine [a)] Tube test	0.01 - 2.0 mg/l	528	-	-	-	-	DPD [1, 2]	16 mm ø
Chlorine dioxide Tablets	0.05 - 11 mg/l 0.01 - 3.8 mg/l 0.1 - 11 mg/l	- 528 -	- - -	- - 528	530 - -	- - -	DPD/Glycine [1,2]	24 mm ø 24 mm ø 24 mm ø
Chloride Tablets	0.5 - 25 mg/l 5 - 250 mg/l [i)]	- -	528 528	- -	- -	- -	Silver nitrate / turbidity	24 mm ø
Copper [a)] Tablets	0.05 - 5 mg/l	528	528	528	560	560	Biquinoline [4]	24 mm ø
Copper free Tablets	0.02 - 1 mg/l	-	580	-	-	-	Zincon [3] / EDTA	24 mm ø
Copper, free VARIO Powder reagent	0.05 - 5 mg/l	560	-	-	-	-	Bicinchoninate	24 mm ø
Cyanuric acid Tablets	2 - 160 mg/l [i)]	528	-	528	530	530	Melamine	24 mm ø

MSDS (Material Safety Data Sheets): www.tintometer.com

For other reagent quantities please see our current price list.

Legend

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[4] Photometrische Analyse, Lange/Vejdelek, Verlag Chemie; 1980
[5] Colorimetric Chemical Analytical Methods, 9th Edition, Lovibond®

Display	Reagent	Form of reagent/Quantity	Order code
Cl_2	VARIO Chlorine FREE-DPD/F10	Powder Pack / 100	53 01 00
	VARIO Chlorine TOTAL-DPD/F10	Powder Pack / 100	53 01 20
Cl_2	ACIDIFYING GP	Tablet / 100	51 54 80
	CHLORINE HR (KI)	Tablet / 100	51 30 00
	Combi pack# CHLORINE HR (KI)/ACIDIFYING GP	each 100	51 77 21
	Combi pack# CHLORINE HR (KI)/ACIDIFYING GP	each 250	51 77 22
Cl_2	Tube test DPD Chlorine, free	Reaction tube / 50	
	TT DPD RGT TOTAL	Powder Pack / 50	
		Set (Tube test)	2 42 07 60
ClO_2	DPD No. 1	Tablet / 100	51 10 60 BT
	DPD No. 3	Tablet / 100	51 10 80 BT
	Combi pack# DPD No.1 / No.3	each 100	51 77 11
	Combi pack# DPD No.1 / No.3	each 250	51 77 12
	GLYCINE [f]	Tablet / 100	51 21 70
	Combi pack# DPD No.1 / GLYCINE	each 100	51 77 31
	Combi pack# DPD No.1 / GLYCINE	each 250	51 77 32
	DPD No.1 High Calcium[e]	Tablet / 100	51 57 40
Cl	CHLORIDE T1	Tablet / 100	51 59 10
	CHLORIDE T2	Tablet / 100	51 59 20
Cu	COPPER No. 1	Tablet / 100	51 35 50
	COPPER No. 2	Tablet / 100	51 35 60
	Combi pack# COPPER No.1 / No.2	each 100	51 76 91
	Combi pack# COPPER No.1 / No.2	each 250	51 76 92
Cu	COPPER/ZINC LR	Tablet / 100	51 26 20
	EDTA	Tablet / 100	51 23 90
	DECHLOR	Tablet / 100	51 23 50
	(necessary if high level of residual chlorine ia available in the sample)		
Cu	Vario Cu 1 F10	Powder Pack / 100	53 03 00
Cys	CYANURIC ACID	Tablet / 100	51 13 20 BT

[a] determination of free, combined and total
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[c] MultiDirect/PoolDirect: Adapter is necessary for Vacu-vials® (Order code 19 20 75)
[d] Spectroquant® is a Merck KGaA Trademark
[e] alternative reagent, used instead of DPD No.1 in case of turbidity in the water sample caused by high concentration of calcium and/or high conductivity
[f] additionally required for determination of chlorine dioxide / ozone in the presence of chlorine
[g] Reagent recovers most insoluble iron oxides without digestion
[h] additionally required for samples with hardness values above 300 mg/l $CaCO_3$
[i] high range by dilution
[#] no BT blister tablets, including stirring rod, 10 cm

Reagents

Test	Range	Wavelength λ / nm MiniDirect	CheckitDirect	CheckitDirect+	PoolDirect	PoolDirect 9 in 1	Method	Cuvette
Hardness, calcium Tablets	50 - 900 mg/l	-	-	-	560	560	Murexide [4]	24 mm ø
Hardness, calcium Tablets	0 - 500 mg/l [i)]	-	-	528	-	-	Murexide [4]	24 mm ø
Hardness, total Tablets	2 - 50 mg/l 50 - 500 mg/l [i)]	- -	- 528	- -	560 -	- -	Metallphthalein [3]	24 mm ø
Hydrogen peroxide Tablets	0.03 - 3 mg/l	-	-	-	530	-	DPD/Catalyst [5]	24 mm ø
Iodine Tablets	0.05 - 3.6 mg/l	-	-	-	530	-	DPD [5]	24 mm ø
Iron (II, III) soluble Tablets	0.02 - 1 mg/l 0.2 - 10 mg/l [i)]	528 -	528 528	528 -	560 -	- -	PPST [3]	24 mm ø 24 mm ø
Iron VARIO (II, III) soluble Powder reagent	0.02 - 3 mg/l 0.05 - 5 mg/l	- 528	- -	- -	- -	- -	1,10-Phenanthroline [2]	24 mm ø
Iron VARIO, total [g)] Powder reagent	0.05 - 1.8 mg/l	528	-	-	-	-	TPTZ [g)]	24 mm ø
Manganese Tablets	0.05 - 4 mg/l	-	430	-	-	-	Formaldoxime	24 mm ø
Manganese VARIO HR Powder reagent	0.1 - 20 mg/l	528	-	-	-	-	Periodate oxidation[2]	24 mm ø
Oxygen, activ Tablets	0.1 - 10 mg/l	-	-	-	530	-	DPD	
Ozone (DPD) Tablets	0.02 - 1 mg/l	-	-	-	530	530	DPD/Glycine [5]	24 mm ø 50 mm □

MSDS (Material Safety Data Sheets): www.tintometer.com

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[4] Photometrische Analyse, Lange/Vejdelek, Verlag Chemie; 1980
[5] Colorimetric Chemical Analytical Methods, 9th Edition, Lovibond®

Display	Reagent	Form of reagent/Quantity	Order code
$CaCO_3$	CALCHECK	Tablet / 100	51 56 50
$CaCO_3$	CALCIO H No.1	Tablet / 100	51 10 30
	CALCIO H No.2	Tablet / 100	51 10 40
	Combi pack# CALCIO H No.1 / No.2	each 100	51 77 61
	Combi pack# CALCIO H No.1 / No.2	each 250	51 77 62
$CaCO_3$	HARDCHECK P	Tablet / 100	51 56 60
H_2O_2	HYDROGENPEROXIDE LR	Tablet / 100	51 23 80
I	DPD No. 1	Tablet / 100	51 10 60 BT
Fe	IRON LR	Tablet / 100	51 53 70
	IRON (II) LR	Tablet / 100	51 54 20
Fe	VARIO Ferro F10	Powder Pack / 100	53 05 60
Fe	VARIO TPTZ F10	Powder Pack / 100	53 05 50
Mn	MANGANESE LR 1	Tablet / 100	51 60 80
	MANGANESE LR 2	Tablet / 100	51 60 90
	Combi pack# MANGANESE LR 1 / LR 2	each 100	51 76 21
	Combi pack# MANGANESE LR 1 / LR 2	each 250	51 76 22
Mn	VARIO Manganese Citrate Buffer F10	Powder Pack / 100	
	VARIO Sodiumperiodate F10	Powder Pack / 100	
		Set	53 51 00
O_2	DPD No. 4	Tablet / 100	51 12 20 BT
O_3	DPD No. 1	Tablet / 100	51 10 60 BT
	DPD No. 3	Tablet / 100	51 10 80 BT
	Combi pack# DPD No.1 / No.3	each 100	51 77 11
	Combi pack# DPD No.1 / No.3	each 250	51 77 12
	GLYCINE [f]	Tablet / 100	51 21 70
	Combi pack# DPD No.1 / GLYCINE	each 100	51 77 31
	Combi pack# DPD No.1 / GLYCINE	each 250	51 77 32

[a] determination of free, combined and total
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[f] additionally required for determination of chlorine dioxide / ozone in the presence of chlorine
[g] Reagent recovers most insoluble iron oxides without digestion
[h] additionally required for samples with hardness values above 300 mg/l $CaCO_3$
[i] high range by dilution
[#] no BT blister tablets, including stirring rod, 10 cm

Reagents

Test	Range	Wavelength λ / nm MiniDirect	CheckitDirect	CheckitDirect+	PoolDirect	PoolDirect 9 in 1	Method	Cuvette
Ozone (Indigo) Tablets	0.05 - 0.5 mg/l	-	605	-	-	-		24 mm ø
PHMB (Biguanide) Tablets	2 - 60 mg/l	-	-	-	560	-	Buffer/Indicator	24 mm ø
Phosphate LR, ortho Tablets	0.05 - 4 mg/l 0.1 - 4 mg/l	- 660	660 -	- -	610 -	- -	Phosphomolybdic acid/ Ascorbic acid [2]	24 mm ø
Phosphate HR, ortho Tablets	10 - 100 mg/l	-	470	-	-	-	Vanadomolybdate [2]	24 mm ø
Phosphate VARIO ortho Powder reagent	0.06 - 2.5 mg/l	660	-	-	-	-	Ascorbic acid [2]	24 mm ø
pH value Tablets	6.5 - 8.4	528	-	528	560	560	Phenol red [5]	24 mm ø
pH value Liquid reagent	6.5 - 8.4	528	-	528	560	-	Phenol red [5]	24 mm ø
Sodium hypochlorite Tablets	0.2 - 16 %	-	-	-	530	-	Potassium iodide [5]	24 mm ø
Sulphate VARIO Powder reagent	5 - 100 mg/l	-	-	-	530	-	Bariumsulphat-Turbidity [2]	24 mm ø
Turbidity	0.1 - 2000	-	875	-	-	-	Nephelometric	24 mm ø
Urea Tablet/Liquid reagent	0.1 - 3 mg/l 0.2 - 6 mg/l [1)]	- -	660 660	660 -	610 -	- -	Urease / Indophenol	24 mm ø

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[4] Photometrische Analyse, Lange/Vejdelek, Verlag Chemie; 1980
[5] Colorimetric Chemical Analytical Methods, 9th Edition, Lovibond®

Display	Reagent	Form of reagent/Quantity	Order code
O_3	OZONE	Tablet / 100	51 31 70
PHMB	PHMB PHOTOMETER	Tablet / 100	51 61 00
PO_4	PHOSPHATE No. 1 LR	Tablet / 100	51 30 40
	PHOSPHATE No. 2 LR	Tablet / 100	51 30 50
	Combi pack# PHOSPHATE No.1 LR / No.2 LR	each 100	51 76 51
	Combi pack# PHOSPHATE No.1 LR / No.2 LR	each 200	51 76 52
PO_4	PHOSPHATE No. 1 HR	Tablet / 100	51 58 10
	PHOSPHATE No. 2 HR	Tablet / 100	51 58 20
	Combi pack# PHOSPHATE No.1 HR / No.2 HR	each 100	51 76 61
	Combi pack# PHOSPHATE No.1 HR / No.2 HR	each 200	51 76 62
PO_4	VARIO Phosphate Rgt., F10	Powder Pack / 100	53 15 50
pH	PHENOLRED / PHOTOMETER	Tablet / 100	51 17 70 BT
pH	PHENOLRED Solution	Liquid reagent / 15 ml	47 10 40
NaOCl	ACIDIFYING GP	Tablet / 100	51 54 80
	CHLORINE HR (KI)	Tablet / 100	51 30 00
	Combi pack# CHLORINE HR (KI)/ACIDIFYING GP	each 100	51 77 21
	Combi pack# CHLORINE HR (KI)/ACIDIFYING GP	each 250	51 77 22
SO_4	VARIO Sulpha 4 / F10	Powder Pack / 100	53 21 60
NTU	no reagents required	-	-
CH_4N_2O	UREA Reagent 1	Liquid reagent / 15 ml	45 93 00
	UREA Reagent 2	Liquid reagent / 10 ml	45 94 00
	AMMONIA No. 1	Tablet / 100	51 25 80
	AMMONIA No. 2	Tablet / 100	51 25 90
	Combi pack# AMMONIA No.1 / No.2	each 100	51 76 11
	Combi pack# AMMONIA No.1 / No.2	each 250	51 76 12

[a] determination of free, combined and total
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[i] high range by dilution
[#] no BT blister tablets, including stirring rod, 10 cm

Natural Swimming Ponds

A natural swimming pond looks like a natural garden pond, but is specifically designed to swim in clean, pure water with no chemicals in it.

The difference between a swimming pond and a swimming pool is that a swimming pool uses chemicals such as chlorine to kill bacteria, whereas a swimming pond cleanses the water naturally. It uses the purifying properties of plants, a filter to extract surface debris such as leaves, and a pump to keep the water circulating through the planting area.

Nevertheless, the water quality has to be checked regularly to make sure that the bathers are safe under all circumstances, e.g. microorganism and other biological, chemical and physical components.

Bathing Water

This applies to any water where the authorities expect a large number of people to bathe and has not imposed a permanent bathing prohibition, or issued advice against bathing. It is the responsibility of the authorities to identify and assess causes of pollution that might affect bathing waters and impair bathers´ health during the bathing season.

The basis for the control of all public used natural swimming ponds is the European Directive "2006/7/EG of the European Parliament, dated 15th February 2006. The Directive is valid since 24th March 2006.

Photo: Schwimmbad & Sauna / Biotop

Microbiological, chemical and physical quality criteria

Water quality includes all physical, chemical and biological factors that influence the beneficial use of water. There are many water quality variables in natural swimming ponds and bathing water in general. These are the most important criterias:

Microbiology

- Escherichia coli
- Enterococci
- Pseudomonas aeroginosa
- Legionella pneumophila
- Cyano bacteria

Parasites

- e.g. Cryptosporidia

Photo: Schwimmbad & Sauna / Grafinger

Chemical and physical characteristics

Dissolved Oxygen

Dissolved oxygen is probably the most critical quality variable in the water. Oxygen levels in pond systems depend on water temperatures, the water salinity, and the amount of aquatic vegetation and animals.

pH-value

The pH-value is the determination of the hydrogen ion (H^+) concentration in water. The pH scale ranges from 0-14 with a pH of 7 being neutral. A pH below 7 is acidic and an pH of above 7 is basic. An optimal pH range is between 6.5 and 8.5, however it should not be lower than pH5 or above pH9.

pH will vary depending on a number of factors. The pH may rise during the day as phytoplankton and other aquatic plants remove CO_2 from the water during photosynthesis. The pH decreases at night because of respiration and production of CO_2 by organisms. The fluctuation of pH levels will depend on algae levels as well.

Temperature

Temperature will affect all chemical and biological processes. Temperature therefore has a direct effect on important factors such as growth and oxygen demand. The higher the temperature, the greater the requirement for oxygen and the faster the growth rate of the plants.

Ammonia

Ammonia is produced from the decomposition of organic wastes resulting in the breakdown of decaying organic matter such as algae and plants. Ammonia levels will depend on the temperature of the water and its pH. For example at a higher temperature and pH, a greater number of ammonium ions are converted into ammonia gas thus causing an increase in toxic ammonia levels within the freshwater.

Nutrient levels

Nutrient levels refer to the amount of phosphorus and nitrogen that are present in the water. Increased levels of nutrients may be harmful. It can cause excessive plankton growth, potential blue-green algae and oxygen depletion.

Turbidity

see pages 70 and 71

MicroDirect (IP 67 waterproof)

pH-value
ORP/Redox
TDS
Conductivity
Salinity
Temperature

Photo: Schwimmbad & Sauna / Grafinger

MicroDirect	pH 10	pH 30	ORP/Redox 10	Conductivity EC 11
Range	0...14 pH		-999...+1000 mV	0...2000 µS/cm 0...20,00 mS/cm[1)]
Resolution	0.1 pH	0.01 pH	1 mV	10 µS/cm
Accuracy	± 0,1	± 0,01	± 1 % Full scale	± 1 % Full scale
Calibration	3-point		1-point	1413 µS/cm 12.88 mS/cm
Temperature				
Display	---	0...50 °C/32-122°F	---	0...50 °C/32-122°F
Resolution	---	0.1°C/°F	---	0.1°C/°F
Accuracy	---	± 0.5°C/0.9°F	---	± 0.5°C/0.9°F
Compensation	0-50 °C / 32-122 °F		---	0-50 °C/32-122 °F
Operation Temp.	0-50 °C		---	0-50 °C
Battery Capacity	> 500 h	> 500 h	> 500 h	> 150 h
Auto Off	ca. 8.5 minutes after last keypress			
Size/Weight	ca. 16.5 cm x 3.8 cm ,90 gr			
with Packaging	ca. 22 cm x 6 cm x 5 cm,170 gr			
Order Code	19 46 41	19 46 31	19 46 61	19 46 81

MicroDirect	TDS 11	Salinity 11	Temperature
Range	0...2000 ppm 0...10,00 ppt[2)]	0...10.00 ppt[3)] NaCl	-40...+200 °C changeable to °F
Resolution	10 ppm 0.10 ppt	0.10 ppt	0.1 °C
Accuracy	± 1 % Full Scale	± 1 % Full Scale	± 1 °C from -10°C...+100°C ± 2 °C > +100°C...+200°C
Calibration	9.98 ppm 9.02 ppt	1-Point	
Temperature			
Display	0-50 °C 32-122°F	0-50 °C 32-122°F	
Resolution	0.1°C/°F	0.1°C/°F	
Accuracy	±0.5°C/0.9°F	±0.5°C/0.9°F	
Compensation	0-50 °C / 32-122°F		
Operation Temp.	0-50 °C		0°C...40 °C max. 80°C (cable)
Battery Capacity	> 150 h	> 150 h	ca. 1 year
Auto Off	ca. 8.5 minutes after last keypress		ca. 15 minutes after last keypress
Size/Weight	ca. 16.5 cm x 3.8 cm ø, 90 gr		ca. 9.5 cm x 6.0 cm x 1.8 cm, ca.130 gr
with Packaging	ca. 22 cm x 6 cm x 5 cm,170 gr		ca. 26 cm x 7.5 cm x 2.0 cm, ca.160 gr
Order Code	19 47 01	19 47 11	19 47 30

The MicroDirect series is a range of waterproof and dust-tight (IP67) units for the determination of pH, ORP/redox, conductivity, TDS, salinity and temperature.
The compact, robust housing and replaceable electrodes meet the high standards required of state of the art technology.

All units are equipped with an automatic switch-off and a "Hold" function which freezes the result in the display with a single keypress.

Delivery Content

Each MicroDirect will be supplied with batteries, lanyard, instruction manual as a ready to use unit in a sturdy plastic box (exeption: MicroDirect Temperature).

Conversion table

[1)] 0 - 20.00 mS/cm = 0 - 20000 µS/cm
[2)] 0 - 10.00 ppt TDS = 0 - 10000 ppm TDS
[3)] 0 - 10.00 ppt NaCl = 0 - 10000 ppm NaCl
0 - 10.00 ppt NaCl = 0 - 1 % NaCl
0 - 10.00 ppt NaCl = 0 - 10 g/l NaCl
ppm = Parts per Million = mg/l
ppt = Parts per Thousand = g/l

SensoDirect 110

Determination of:

pH (0-14)
Conductivity (mS/cm)
Salinity (%)

pH110

The SensoDirect pH110 is a high quality, portable, battery operated pH meter. The instrument is equipped as standard with protective casing and built-in electrode holder.

The gel electrode of the SensoDirect pH110 is temperature resistant over the range 0 - 80 °C. It is fitted with a BNC connector as standard.

Technical data pH110

Range:	0 - 14 pH
Resolution:	0.01 pH
Temperature compensation:	not necessary
Accuracy:	± 0.07 pH (pH5-pH9) ± 0.1 pH (pH4-pH10) ± 0.2 pH (pH1-pH3.9) ± 0.2 pH (pH10,1-pH13) 23 ± 5 °C, after calibration
Ambient conditions:	0 - 50 °C 0 - 80 % rel. humidity (non condensing)
Battery:	9 V block
Dimensions:	208 x 110 x 34 mm (L x W x H)
Weight:	approx. 380 g
CE:	EN 55022-class B (EN 50081-1) IEC 801-2 (EN 50082-1) IEC 801-3 (EN 50082-1)
Order Code	72 13 00

Delivery Content

SensoDirect pH110, battery, pH-buffer (4.0 / 7.0), pH plastic electrode-type 110, in case, instruction manual and guarantee sheet.

Accessories SensoDirect pH110

Code	Article
721330	pH-electrode plastic/gel, type pH110
721247	pH-buffer, 4.00 (25°C), 90 ml
721248	pH-buffer, 7.00 (25°C), 90 ml
721249	pH-buffer, 10.00 (25°C), 90 ml

Con110

The SensoDirect Con110 is a compact and versatile meter. The unit is extremely easy to use and is equipped as standard with a protective casing and built-in electrode holder.

It is equipped with a LC display showing two or three decimal places and a measuring range either of 0.001 – 1.999 or 0.01 – 19.99 mS/cm.

As conductivity measurement also depends on temperature, the SensoDirect Con110 includes an automatic temperature compensation feature.

The SensoDirect Con110 can be calibrated and adjusted using a potentiometer.

Technical data Con110

Range :	0.001 - 1.999 mS/cm 0.01 - 19.99 ms/cm
Resolution :	0.001 / 0.01 mS/cm
Temperature compensation:	0 - 100 °C automatically 2 %/K, 25 °C
Accuracy :	± 3 % Full Scale ± 1 Digit (23 ± 5 °C)
Ambient conditions:	0 - 50 °C 0 - 80 % rel. humidity (non condensing)
Battery:	9 V-Block
Dimensions:	208 x 110 x 34 mm (L x W x H)
Weight:	approx. 380 g
CE:	EN 55022-class B (EN 50081-1) IEC 801-2 (EN 50082-1) IEC 801-3 (EN 50082-1)
Order code	72 23 00

Delivery Content

SensoDirect Con110 battery, conductivity sensor, in case, instruction manual and guarantee sheet.

Accessories SensoDirect Con110

Code	Article
722250	Conductivity calibration solution, 1413 µS/cm, 500 ml

Salt110

The portable SensoDirect Salt110 provides fast, accurate readings and the convenience of a remote probe separately.

The measuring range of this salt tester is 0 to 10 % salt (% weight).

The SensoDirect Salt110 includes an automatic temperature compensation feature.

The unit is extremely easy to use and is equipped as standard with a protective casing and built-in electrode holder.

Technical data Salt110

Range:	0 - 10 % Salt
Resolution:	0,01 % Salt
Temperature compensation:	0 - 50 °C, automatically
Accuracy:	± 0,5 % (23 ± 5 °C)
Ambient conditions:	0 - 50 °C 0 - 80 % rel. humidity (non condensing)
Battery:	9 V-Block
Dimensions:	208 x 110 x 34 mm (L x W x H)
Weight:	approx. 380 g
CE:	EN 55022-class B (EN 50081-1) IEC 801-2 (EN 50082-1) IEC 801-3 (EN 50082-1)
Order code	72 33 00

Delivery Content

Salt110 battery, sensor, in case, instruction manual and guarantee sheet.

SensoDirect 200 (IP 67 waterproof)

Dissolved Oxygen (O_2)
O_2-concentration mg/l
O_2-saturation in %
°C/°F

TDS/Conductivity/Salinity
°C/°F

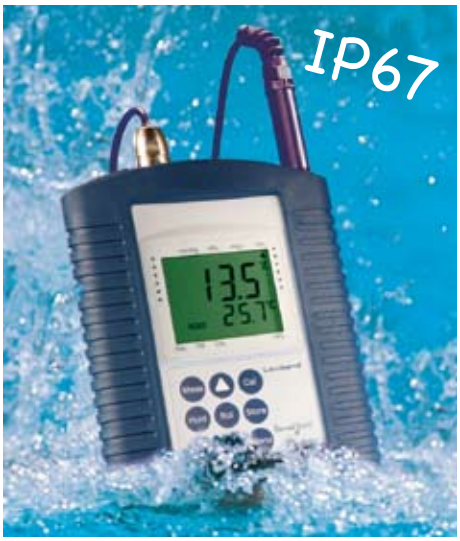
pH/Redox/ORP
°C/°F

The microprocessor-controlled SensoDirect range of handheld meters from Lovibond® meets the day-to-day demands for sturdy and reliable systems for the measurement of pH value or ORP/Redox, conductivity/TDS and dissolved oxygen.

The water-tight housing complies with **IP67** and is equipped as standard with protective armouring and built-in electrode holder ensuring reliable operation even in extreme ambient conditions.

The support can be flipped up to hang the meter on pipes or branches.

A direct, easily understood user interface, outlining the required configuration options for all three systems, facilitates meter operation both outdoors and in the laboratory.



The automatic Hold function "freezes" stable measuring data in the display and indicates the presence of stable and reproducible results.

The internal memory allows storage of 20 data sets to facilitate subsequent evaluation.

The integral automatic switch-off feature, varying from 1 to 120 minutes, increases the operating life of the units.

The power consumption of all three units has been reduced to a minimum. As a result, the 4 x 1.5 V integrated batteries have an operating life of up to 15000 hours, depending on the unit version.

pH200

- pH / redox measurement and temperature measurement (Pt1000 or NTC 30kOhm)
- Automatic temperature compensation (ATC)
- Auto Hold function
- Internal memory for 20 data sets
- Automatic buffer recognition with Tintometer standard or DIN or individual buffer
- 1, 2 and 3 point calibration
- Low battery and battery change indicator
- Sensor evaluation in the display based on the calibration result (from 10 to 100%)
- Battery operation period up to 15000 hours
- Shock-absorbing rubber protective armouring
- Waterproof

Con200

- Conductivity, Total Dissolved Solids (TDS), Salinity and Temperature measurement
- Dirt-insensitive up-to-date 4-pole conductivity cell offering highest precision
- Automatic temperature compensation (ATC)
- Min/Max value storage
- Internal memory for 20 data sets
- Linear and non-linear temperature compensation (EN27888)
- Calibration against standard solutions
- Low battery and battery change indicator
- Shock-absorbing rubber protective armouring
- Battery operation period up to 3000 hours
- Waterproof

Oxi200

- Oxygen partial pressure,
  Oxygen concentration,
  Oxygen saturation,
  Temperature measurement
- Automatic absolute air pressure measurement
- Auto Hold function
- Easy calibration against oxygen in air
- Salinity correction
- Self-polarising galvanic oxygen probe, allows instant measurement after the system is switched on
- Low battery and battery change indicator
- Sensor evaluation in the display
- Accessories for depth measurement
- Battery operation period up to 12000 hours
- Shock-absorbing rubber protective armouring
- Waterproof

pH 200

Technical Data

pH:	0.00 ... 14.00
Accuracy:	± 0.01 pH (at nominal temperature, unit ± 1 digit)
Temperature:	-10.0 ... +110.0 °C 14.0 ... 230.0 ° F
Accuracy:	±0.2 °C (-0..50 °C), otherwise ± 0.4 °C
Redox (ORP):	-1999 ... +2000 mV
Relative Redox:	-1792 ... +2206 Rel mV (based on DIN 38 404
Accuracy:	± 0.1 % FS (mV or Rel mV)
Sensor connections:	DIN 19262 and two 4 mm banana sockets "Temp" and "Ref"
Input resistance:	>1012 Ohm (typ.)
Input current:	<1 pA
Nominal temperature:	25 °C
Operating temperature:	0 to +50 °C
Storage temperature:	-20 to +70 °C
Power supply:	4 x 1.5V battery, type AA Operating time up to >15,000h
Power consumption:	0.2 mA
Auto-Off function:	0 - 120 minutes
Calibration:	1-, 2- or 3-point calibration with auto buffer recognition Tintometer buffer, DIN buffer or user-selectable buffer
CE:	EN 55 022 : 6 / 1993 class B, EN 50 082-1 (EN 61000-4-6, EN 61000-4-4, EN 61000-4-3, EN 61000-4-2 conforms to the EMC Directive 89/336/EEC and 73/23/EEC

SensoDirect pH200 in carrying case

Delivery Content

SensoDirect pH200

Code	Article
721200	SensoDirect pH200, without electrode, with batteries, instruction manual, lanyard, in case
721220	SensoDirect pH200 (SET 1) instrument, batteries, pH/temp. plastic-electrode type 230, pH-buffer-set (pH 4.00/7.00/10.00), in case, manual, guarantee sheet
721221	SensoDirect pH200 (SET 2) as SET1, but with pH/temp. plastic-electrode type 225, and temperature sensor Pt 1000, manual, guarantee sheet

Accessories pH200

721225	pH-electrode plastic/gel-type 225
721230	pH/temp.-electrode type 230 plastic/gel/temperature NTC30kOhm
721235	pH-electrode glass/gel-type 235
721240	Redox-electrode plastic-type 240
721245	Temperature sensor
418609	KCl-solution, 3 molar saturated with AgCl, 100 ml
721250	pH buffer-set 4.00/7.00/10.00 (25°C)
721252	pH buffer 4.00 (25°C) 1 litre
721254	pH buffer 7.00 (25°C) 1 litre
721256	pH buffer 10.00 (25°C) 1 litre
721260	Adapter cable DIN19262 - BNC
721265	Adapter cable DIN19262, S7 plug-head
725010	Lanyard
725020	Case with foam inlet

Con 200

Technical Data

Conductivity:	0.0 ... 200.0 µS/cm 0 ... 2000 µS/cm 0.00 ... 20.00 mS/cm 0.0 ... 200.0 mS/cm
Resistance:	0.005 ... 100.0 kOhm*cm
TDS:	0 ... 1999 mg/l
Salinity:	0.0 ... 70.0 g/kg
Accuracy:	± 0.5 % v. MW ± 0.5 % FS (± 3 digits)
Temperature:	-5.0 ... 100.0 °C 23.0 ... 212 ° F
Accuracy:	±0.3K
Cell constant:	0.50 ± 0.10 cm-1
Temperature compensation:	selectable: - linear , 0.3 to 3.0 %/K - non-linear in acc. with EN 27 888 - no compensation
Reference temperature:	20 °C and 25 °C
Calibration:	1-point calibration in the range from 1000 to 2000 µS/cm
Nominal temperature:	25 °C
Operating temperature:	Unit: 0 to + 50 °C Measuring cell: -5 to 80 °C (up to 100 °C for short periods)
Power supply:	4 x 1.5 V battery, Type AA Operating time up to 1500 h
Power consumption:	ca. 2 mA, max. 4.2 mA
Auto-Off function:	0 - 120 minutes
Measuring cell:	4-pole conductivity measuring cell with integrated temperature-sensor (NTC10kOhm). Electrode material: special graphite Shaft material: epoxy Temperature sensor: stainless steel Dimensions: diameter 12 mm, 120 mm long
CE:	EN 55 022 : 6 / 1993 class B, EN 50 082-1 (EN 61000-4-6, EN 61000-4-4, EN 61000-4-3, EN 61000-4-2 conforms to the EMC Directive 89/336/EEC and 73/23/EEC

SensoDirect Con200 in carrying case

Delivery Content

SensoDirect Con200

Code	Article
722220	SensoDirect Con200 with, batteries, 4-Pole conductivity cell, in case, manual, guarantee sheet

Accessories Con200

Code	Article
722225	SensoDirect Conductivity Cell, 4-Pole Technology
722250	Calibration solution 1413µS/cm
725010	Lanyard
725020	Case with foam inlet

Oxi 200

Technical Data

O_2 partial pressure:	0.0...570.0 hPa, 0...1200 hPa 0.0...427.5 mm Hg, 0...900 mm Hg
O_2 concentration:	0.00...25.00 mg/L, 0.0...70.0 mg/L
O_2 saturation:	0.0...250.0 %, 0...600 %
Accuracy:	± 1.5% ± 0.2 mg/L (0...25 mg/L) ± 2.5% ± 0.3 mg/L (25...70 mg/L) ±1Digit
Temperature:	-5.0 ... + 50.0 °C 23.0 ... 122.0 ° F
Accuracy:	± 0.1 °C
Abs. air pressure:	500..1100 hPa
Accuracy:	± 0.5% full scale
Nominal temperature:	25 °C
Operating temperature:	0 to +50 °C
Storage temperature:	-20 to +70 °C
Power supply:	4 x 1.5 V battery, Type AA Operating time up to 12.000 h
Power consumption:	max. 0.25 mA
Auto-Off function:	0 - 120 minutes
Dimensions:	175 x 140 x 45 mm (L x W x H)
Weight:	approx. 580 g
Electrode:	Self-polarising oxygen electrode with integrated NTC sensor Connection: 7-pin DIN socket Installation diameter: 12.0 ± 0.2 mm Overall length: approx. 220 mm (incl. kink protection) Operating temperature: 0...40 °C
CE:	EN 55 022 : 6 / 1993 class B, EN 50 082-1 (EN 61000-4-6, EN 61000-4-4, EN 61000-4-3, EN 61000-4-2 conforms to the EMC Directive 89/336/EEC and 73/23/EEC

Delivery Content

SensoDirect Oxi200

Code	Article
723220	SensoDirect Oxi200 with batteries, oxygen sensor (1.5 m cable), electrolyte (KOH), 3 interchangeable membrane heads, in case, manual, guarantee sheet
723221	SensoDirect Oxi200 as above, but with oxygen sensor 10 m cable
723222	SensoDirect Oxi200 as above, but with oxygen sensor 30 m cable

Accessories Oxi200

Code	Article
723201	Oxygen sensor, 1.5 m cable
723210	Oxygen sensor, 10 m cable
723230	Oxygen sensor, 30 m cable
723250	Service Set Oxygen sensor 3 interchangeable membrane heads, 100 ml plastic bottle KOH-solution 3 mol/l
723260	Protection cap for depth measurement
725010	Lanyard
725020	Case with foam inlet

SensoDirect Oxi200 in carrying case

Turbidity Measurement

Photo: Schwimmbad & Sauna

The term "turbidity" is used to describe the cloudiness or milkiness of water.

In physical terms, turbidity is due to particles of varying sizes scattering or absorbing light, giving the water in question a cloudy appearance.

This turbidity is caused by suspended particles such as sludge, limestone, yeast or microorganisms.

The phenomenon of turbidity is measured using optoelectronic meters. An artificial light source emits a known intensity of light through a sample. The suspended particles scatter or absorb the light. The scattered light is then recorded on a photodetector.

Scattered light is generally measured at an angle of 90°. This measurement principle is known as nephelometry.

The results are expressed in terms of FNU (Formazin Nephelometric Units) - identical with NTU (Nephelometric Turbidity Units).

CheckitDirect

The compact Lovibond® infrared turbidity meter CheckitDirect is designed to allow fast, precise on-site testing. The unit measures the scattered light at an angle of 90°, as stipulated in EN ISO 27 027.

The wide measuring range from 0.2 to 2000 TE/F = NTU = FNU with a detection limit of 0.2 NTU permits use of the unit for various media, ranging from pool-, drinking- to waste water.

As infrared light is used for measurement purposes, the unit can be used to test both coloured and colourless liquids.

Delivery Content

CheckitDirect turbidity meter with 4 turbidity standards 1, 10, 100 and 1000 NTU, battery and test vial, in a case, instruction manual and guarantee sheet.

Order code: 20 60 20

Accessories

Secondary standards, set of 1, 10, 100, 1000 NTU
Order code: 19 36 00

Secondary standards 1, 10 NTU and 2 vials
Order code: 19 36 10

Secondary standards 100, 1000 NTU and 2 vials
Order code: 19 36 50

Set of 12 empty sample vials, 24 mm ø
Order code: 19 76 55

Technical data

Measurement cycle:	approx. 9 seconds
Display:	LCD
Optics:	temperature-compensated LED and photosensor amplifier in water proof sample chamber, infrared light
Keypad:	Polycarbonate membrane, splash proof

Power supply:	9 V power pack
Auto - OFF:	automatic switch-off
Range:	T1: 0.2 - 2 NTU T2: 2 - 20 NTU T3: 20 - 200 NTU T4: 200 - 2000 NTU
Resolution:	T1: 0.1 NTU T2: 0.1 NTU T3: 1 NTU T4: 1 NTU
Housing:	ABS
Dimensions: (L x W x H)	190 x 110 x 55 mm
Weight:	approx. 0.4 kg (base unit)
Ambient conditions:	Temperature: 0 – 40 °C rel. humidity: 30 – 90%
CE-conformity:	DIN EN 50081-1. VDE 0839 part 81-1: 1993-03 DIN EN 50082-2. VDE 0839 part 82-2: 1996-02

TurbiDirect

Photo: Schwimmbad & Sauna / Biotop

Turbidity is measured according to ISO 7027 by nephelometric means (90° scattered light). The infrared light-source permits measurement of coloured and colour-free samples.

The automatic measurement range detection facility (Autorange) enables direct turbidity measurement from 0.01 to 1100 NTU with an accuracy of ± 2% up to 500 NTU and ± 3% thereafter.

A large graphic display, a choice of several different languages (German, English, French, Spanish, Italian) and user-friendly operating instructions make the device extremely easy to use.

Software updates (languages; methods; applications) can be downloaded free of charge from our website www.tintometer.com.

Delivery Content

TurbiDirect with accessories, power supply plug, instruction manual and warranty sheet in a plastic carrying case.

Order codes: 19 40 00
19 40 10 (international version)
19 40 20 (U.K. version)

Accessories

Set of 12 sample vials with black lid, height 55 mm, ø 24 mm	19 76 55
Cleaning cloth for vials	19 76 35
Rubber seal cap, black for interface and power plug-in	19 80 17 16
Sample chamber lid, black	19 80 11 19
Mains charger, 100-240 V, 50-60 Hz	19 20 55
Mains charger, 100-240 V, 50-60 Hz, UK connector	19 20 45
Mains charger, 100-240 V, 50-60 Hz, US/Japan connector	19 20 46
Mains charger, 100-240 V, 50-60 Hz, Australia connector	19 20 47
Connection cable connection to PC, serial 9-pins	19 81 98
Akku AA Mignon, 1100 mAh (7 pc.)	19 50 02 0
Lithium battery	19 50 01 7
Formazin Stock Solution (4000 NTU), 100 ml	19 41 41
Formazin Stock Solution (4000 NTU), 250 ml	19 41 42
Set Turbidity Standards T-CAL (<0.1, 20, 200, 800 NTU)	19 41 50
Paper printer DPN 2335	19 80 75
Roll of paper for printer DPN 2335	19 80 62
Pack of accus for printer DPN 2335	19 80 66
Ribbon cartridge for printer DPN 2335	19 80 67

Technical data

Principle	nephelometric (90° scattered light)
Light source	IR-LED (860 nm)
Keypad	conditional acid and solvent resistant; membrane switch keypad with audible feedback
Auto – Off	automatic switch off approx. 20 minutes after last key press
Display	Graphic-Display
Update	Software update via Internet
Clock	real time clock
Memory capacity	1000 data sets with date, time and registration number
Sample volume	approx. 12 ml
Range	0.01 – 1100 NTU (Auto range)
Resolution (NTU)	0.01 from 0.01 - 9.99 0.1 NTU from 10.0 - 99.9 1 NTU from 100 - 1100
Accuracy (NTU)	± 2 % of reading or 0.01 (0 - 500) ± 5 % of reading (500 - 1100)
Ambient conditions	temperature: 5-40°C at 30-90% relative humidity (non condensing)
Interface	RS232 for printer and PC-connection; 9-pin D-sub-mail connector; data format ASCII
Power supply	7 NiCd rechargeable batteries (Type AA/Mignon with 1100mAh); wall plug mains adapter (Input: 100-230V, 50-60Hz; Output: 15V;530mA) and Lithium battery (CR 2032, 3V) for data storage and real time clock.
Weight (instrument)	approx. 1000 g including batteries and power pack
Dimensions (L x W x H)	approx. 265 x 195 x 70 mm
Specification	meets ISO 7027
Approval	CE
Order codes	19 40 00 19 40 10 (international version) 19 40 20 (U.K. version)

Lovibond®-Handbook Swimming and Spa Pool Water Treatment

The handbook includes detailed information on topics relating to swimming pools and spas with reference to the standard methods used for water treatment and testing. National and international standards and regulations are also covered, for instance:

Langelier Saturation Index
"Balanced Water" is the term used to describe pool water that is neither corrosive nor scale forming. The condition of pool water is assessed from the values obtained for pH, total alkalinity, calcium hardness, total dissolved solids (TDS) and temperature, which are converted into factors using a table. These 5 factors are used to calculate the so-called Saturation Index (SI) using the formula:

SI = pH value + TF + AF + CF - TDSF

SI = Saturation Index
TF = Temperature Factor
AF = Total Alkalinity Factor
CF = Calcium Hardness Factor
TDSF = Total Dissolved Solids (TDS) Factor

If the Saturation Index is negative then the water has corrosive tendencies. If it is positive, the water will tend to form scale. A satisfactory "balanced" condition is when Saturation Index is within the range 0 ± 0.3, with a low positive value being prefered.

Handbook order code: 93 81 01

Visit the download area on our website at www.tintometer.com, to obtain a copy of the handbook.

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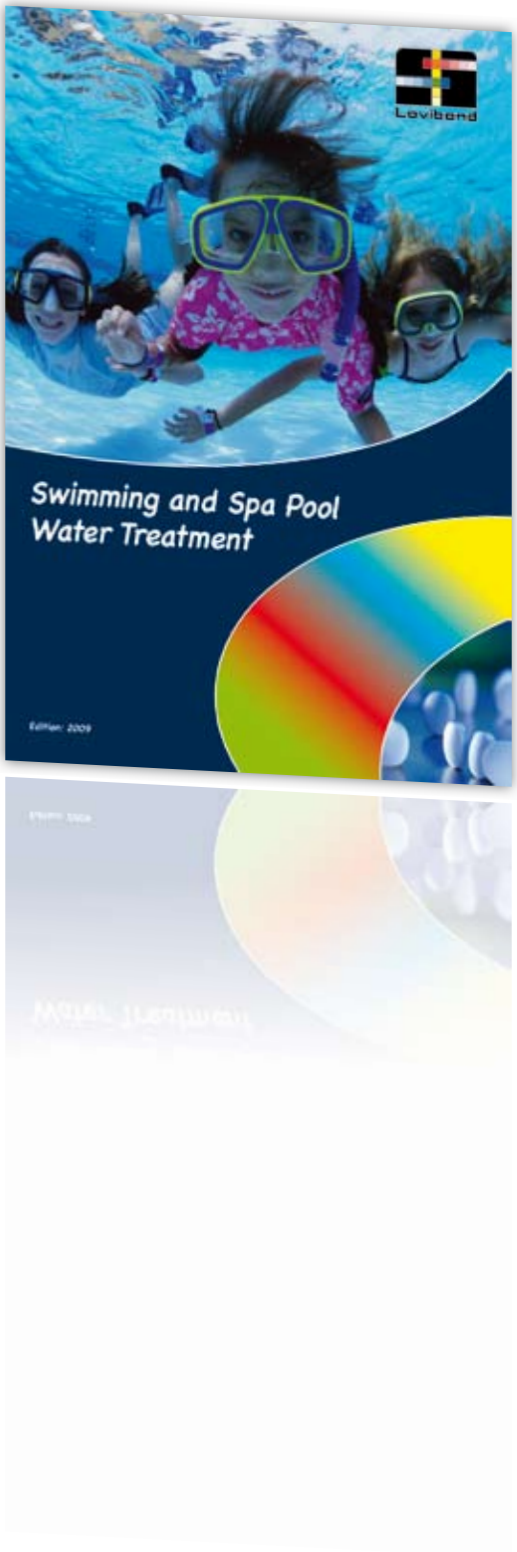


Environmental Water Analysis

Photometer MultiDirect with Dual Beam Technology and Interference Filters

BOD-OxiDirect®

Determination of Biochemical Oxygen Demand (BOD)

COD-Vario

Determination of Chemical Oxygen Demand (COD)

SpectroDirect

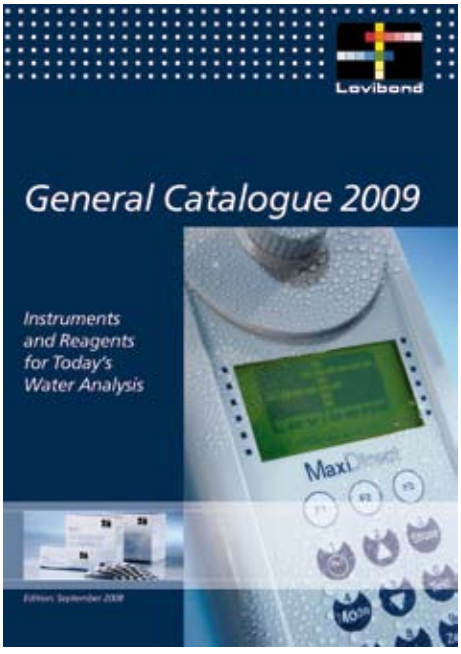
Spectrophotometer for water analysis in laboratories

MaxiDirect

Modern designed photometer for accurate water analysis

Floc-Tester

Floc-Tester with continuously variable stirring speed for laboratory and portable use



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Index

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