AGRAR MEASURING SYSTEMS

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Soil meters
Gas and water analysis
Nutrient analysis
Climatic measuring systems

PRODUCT CATALOGUE 2011

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Cover photo: D. Schneider, 9/09 ®

The price list is valid as of July 1, 2011.
All previous price lists are no longer valid on this date. This document is subject to technical changes without notice.

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SOIL MEASUREMENTS

pH AGRAR 2000

For measuring pH in soil either directly in the field or in the lab

The pH AGRAR 2000 is an important tool for monitoring crop nourishment. Plants grow optimally when a pH value is maintained specifically for that specific plant type. The absorption of certain main nutrients can be hindered if the the pH value is either too high or too low. The technical manual delivered with your Stelzner product contains a detailed list of optimal plant-specific pH values.

The new microprocessor-controlled pH AGRAR 2000 is easy to handle and very precise. It also features a piercing electrode made from glass that is custom designed for agriculture. This makes it the perfect device for agricultural measurements. It features straight-forward pH4 and pH7 automatic calibration. The electrode conductivity slope is displayed (in mV/pH) on the device so that you can check the sensitivity of the pH electrode. An alert is displayed if the pH electrode sensitivity is too low. You can still take measurements when the sensitivity is reduced but you should replace the pH electrode with a new one as soon as possible. Our special pH piercing electrode made from glass features three ceramic diaphragms and a liquid electrolyte. The electrolyte prevents the diaphragms from becoming clogged up with soil. This increases the durability and lifespan of the entire unit. The base unit is enclosed in a sturdy housing that is built to withstand the most demanding requirements of field and lab use.

The pH AGRAR 2000 can be used for direct crop measurements or also for checking substrates, fertilizer solutions and even water quality.

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 14
Resolution:	0.01
Precision:	±0.02
Display:	LCD display
Operating temperature:	+5 to +45 °C
Power supply:	One nine-volt battery, size 6LR61
Run time:	approx. 100 hours
Protection class:	IP40
Dimensions and weight:	125 x 75 x 45 mm, 190 g
Dimensions and weight with case:	350 x 280 x 100 mm approx. 1.8 kg

Art. No.	
3003	**pH AGRAR 2000, base unit without electrode**
3002	**pH AGRAR 2000 complete with case** pH AGRAR 2000 with pH piercing electrode made from glass, pH4 and pH7 buffer solutions, KCl refill solution with filler syringe, $CaCl_2$ powder for analysing soil solutions, piercing pin, spray bottle with deionised water, technical manual
	ACCESSORIES
3010	Plastic pH electrode only for liquids, gel electrolyte
3011	pH piercing electrode made from glass, with 3 diaphragms, 3 mole/l KCl
3028	Cap for pH electrodes
3012	ph 4.0 buffer solution 100 ml bottle
3013	pH 7.0 buffer solution 100 ml bottle
3014	ph 4.0 buffer solution 1000 ml bottle
3015	pH 7.0 buffer solution 1000 ml bottle
3026	Buffer tablets* for calibration solutions 5 tablets for pH 4
3027	Buffer tablets* for calibration solutions 5 tablets for pH 7
3016	Buffer tablets* for calibration solutions 2 x 5 tablets for pH 4 and pH 7
	* Dissolve 1 tablet in 100 ml distilled water
0504	Calcium chloride ($CaCl_2$) for soil analysis (approx. 11.1 g for 10 l solution 0.01 mole/l)
0505	Calcium chloride ($CaCl_2$) for soil analysis (approx. 100 g)
1004	Spray bottle
3022	Refill solution with filler syringe for pH electrodes, 3 mole/l KCl, 100 ml bottle
3017	Dibble
2014	Beaker for measuring volume, 100 ml with cover
3019	One nine-volt battery, size 6LR61

SOIL MEASUREMENTS

pH 205

Precise measurements of pH and temperature for small sample volumes

The pH 205 is a handy insertable meter for measuring pH and temperature. It features automatic temperature compensation. This device is well suited when only small samples are available for measuring, such as for a small partition in a cultivation system. It can also be used to measure in solutions. The insertable probe tip is embedded in impact-resistant plastic. The tip is not sensitive to contamination (thanks to the hole diaphragm) and can be easily replaced. The device also features an illuminated display and buttons with acoustic feedback. Single, double or triple point calibration is possible. The calibration process automatically detects the end value.

TECHNICAL SPECIFICATIONS:

Measurement range:	pH: 0 to 14 Temperature: 0 to +60 °C
Resolution:	pH: 0.01 Temperature: 0.1 °C
Precision:	pH: ±0.02 Temperature: ±0.4 °C
Display:	two-character illuminated LCD display
Operating temperature:	During operations: 0 to +50 °C Storage: –20 to +70 °C
Power supply:	4 LR44 button-cell batteries
Run time:	approx. 80 hours
Protection class:	IP65
Dimensions and weight:	145 x 38 x 167 mm, 215 g
Dimensions and weight with case:	400 x 320 x 90 mm, 2.7 kg

Art. No.	
3100	**pH 205** Base unit with insertion probe, retention cap, belt/wall holder
3102	**pH 205 start set** One-hand meter with insertion probe for measuring pH and °C, retention cap, gel and calibration bottles, 250 ml pH 4 and pH 7, belt/wall holder and aluminium case
	ACCESSORIES
3101	Retention cap for pH 205 filled with KCl
3103	Spare probe for pH 205
3030	ph 4.0 buffer solution 250 ml bottle
3031	ph 7.0 buffer solution 250 ml bottle
3032	ph 10.0 buffer solution 250 ml bottle

pH MEASURING SYSTEMS CHAPTER 1

SOIL MEASUREMENTS

Soil tester

Sturdy tester for direct measurements in the field

The soil tester is the classic solution for taking simple pH measurements in natural soil. It comes with an integrated moisture control mechanism. The tester does not need a power supply. It is not suitable for taking measurements in liquids or peat substrata.

TECHNICAL SPECIFICATIONS:

Measurement range:	3 to 8
Precision:	10 %
Display:	Multi-coloured scale
Dimensions and weight:	160 x 50 mm, 170 g

Art. No.	
3000	**Soil tester pH Meter** Soil tester, measuring sleeve, sand paper, manual with crop value table
	ACCESSORIES
3020	Measuring sleeve for soil samples, for the soil tester pH meter
3023	Sand paper

SOIL MEASUREMENTS

Hellige pH Meter

Simple pH soil testing

The Hellige pH meter is a simple indicator test. This complete kit with instructions includes:

a pH-measurement colour chart, a small spoon for taking soil samples and a drip bottle for 50 to 60 tests with the soil indicator.

Art. No.	
2999	**Hellige pH Meter**
	ACCESSORIES
2998	Indicator solution Refill solution, 100 ml bottle Sufficient for 100 to 120 tests

SOIL MEASUREMENTS

Indicators

Our non-bleeding pH indicator sticks are used for taking quick and easy pH measurements in soil solutions and water.

Measurement range:	pH: 0 to 14
Divisions:	0-1-2-3-4-5-6-7-8-9-10-11-12-13-14
Measurement range:	pH: 2 to 9
Divisions:	2.0-2.5-3.0-3.5-4.0-4.5-5.0-5.5-6.0 6.5-7.0-7.5-8.0-8.5-9.0
Multi-sticks for aquarium use:	Total hardness: 5° to 25° d Carbonate hardness: 3° to 20° d pH: 6.4 to 8.4

Art. No.	
2083	**Measurement range: 0 to 14 pH** (100 pcs.)
2084	**Measurement range: 2 to 9 pH** (100 pcs.)
2085	**Multi-sticks** (100 pcs.)

LIQUID MEASUREMENTS

pHep4

pH/T Pocket Tester

The pH/T pocket tester is designed for taking simple and speedy pH measurements in liquids and features automatic temperature compensation. The tester is housed in a waterproof enclosure and features a double display and battery-charge meter (so you can avoid taking bad measurements with a weak battery). The tester also enables electrodes to be swapped in seconds. Additional features include a stability indicator for reading measured values, automatic shut-off, automatic calibration (single or double point), and a HOLD function for freezing measured values.

TECHNICAL SPECIFICATIONS:

Measurement range:	pH: 0 to 14 Temperature: 0 to +60 °C
Resolution:	pH: 0,1 Temperature: 0.1 °C
Precision:	pH: ±0.1 Temperature: ±0.5 °C
Display:	two-character LCD display
Operating temperature:	0 to +50 °C
Power supply:	4 x 1.5 Volt
Run time:	approx. 350 hours
Dimensions and weight:	163 x 40 x 26 mm, 85 g
Features:	water-proof

Art. No.	
3008	**pHep4**
	pH/T pocket tester with buffer solution pH 4 and 7, wrench
	ACCESSORIES
3009	Spare pH electrode for the pHep4/Combo
3005	ph 4.0 buffer solution 20 ml bag
3006	ph 7.0 buffer solution 20 ml bag

pH MEASURING SYSTEMS CHAPTER 1

LIQUID MEASUREMENTS

pH600

pH pocket tester

The pH600 is an inexpensive and pocket-sized pH tester. It takes quick and easy measurements in liquids and filtered soil solutions. It is suitable for use in horticulture, landscaping, aquariums, hydroponics, swimming pools, ponds and in the laboratory. It is calibrated manually to ph 7.

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 14
Resolution:	0.1
Precision:	±0.2
Display:	LCD display
Operating temperature:	0 to +50 °C
Power supply:	4 x 1.5 Volt
Run time:	approx. 700 hours
Dimensions and weight:	150 x 30 x 24 mm, 85 g

Art. No.	
3007	**pH600**
	pH pocket tester with buffer solution and screwdriver
	ACCESSORIES
3006	ph 7.0 buffer solution 20 ml bag

MEASURING ACTIVITY DIRECTLY IN SOIL

PET 2000

Activity measurements and monitoring crop nourishment

The PET 2000 activity meter can measure the potential absorption of nutrient salts under the same conditions as the actual nutrient salt absorption through the roots. This means that the dissolved salt content is measured in the soil and substrata and thus corresponds to the direct "activity" within the plant canopy. The displayed units are g/l (e.g., grams of salt per litre of substratum). All related soil properties (such as fertilizer concentration, soil humidity, volume density and temperature) and taken into account for the measurement.

The accompanying technical manual can then be used to properly evaluate the measured salt content. In landscape architecture, tree schools, nursery gardens, public parks, forests and all other areas where plants are cultivated, this meter helps to verify and monitor your plan of action. You can optimize your cultivation results with the PET 2000.

When high salt content is being measured, the nitrate test strips (art. no 1100) can be used to differentiate between nitrogen and accompanying salts. The AM probe is available in a variety of lengths (25, 50 or 75 cm with 10-mm diameter) to fit the application. Longer probes are available on request. The AM probe is made from stainless steel and has a 3-cm measuring tip. The probe is maintenance-free. It come with a 9-Volt battery and a splash-water resistant enclosure.

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 2 g/l
Resolution:	0.01 g/l
Precision:	±0.02 g/l
Display:	LCD display
Operating temperature:	+5 to +45 °C
Power supply:	One 9-Volt battery, size 6LR61
Run time:	25 hours
Protection class:	IP40
Dimensions and weight:	125 x 75 x 45 mm, 190 g
Dimensions and weight with case:	350 x 280 x 100 mm approx. 1.6 Kg

Art. No.	
1000	**PET 2000 activity meter**
	Base unit without AM probe
1100	**Soil advisory kit, Type I**
	PET 2000 with AM probe (25 cm), 50 nitrate test strips, 100 ml beaker, Spray bottle with deionised water, technical manual
	ACCESSORIES
1001	AM probe (75 cm)
1002	AM probe (50 cm)
1003	AM probe (25 cm)
2005	Nitrate test strips Box with 100 strips
1004	Spray bottle
2014	Beaker for measuring volume, 100 ml with cover
3019	One nine-volt battery, size 6LR61

SOIL ACTIVITY CHAPTER 2

MEASURING ACTIVITY DIRECTLY IN SOIL

PE controller

Straightforward monitoring of plant nourishment

The PE CONTROLLER is designed for simple on-site monitoring of plant nourishment. It can measure the potential absorption of nutrient salts under the same conditions as the nutrient salt absorption through the roots as the time of the measurement. This easy-to-use instrument can display on-site whether there is too little, too much, or the right amount of available fertilizer present.

The measurement is taken directly in the substratum, compost, garden soil, or greenhouse. This allows you to monitor the nutrient status potted plants, balcony boxes, container plants and vegetable beds. You can be sure that you're not using too much or too little nutrients with the PE CONTROLLER. This handy tool is a must for every hobby gardener. The probe is 25 cm long and has a diameter of 10 mm.

Art. No.	
1011	**PE controller with AM probe**
1012	**PE controller with case**
	PE controller with AM probe (25 cm), 50 nitrate test strips, 100 ml beaker, Spray bottle with deionised water
	ACCESSORIES
2005	Nitrate test strips, Box with 100 strips
1004	Spray bottle
3019	One nine-volt battery, size 6LR61

EC 2000

Measuring conductivity in a solution

Electrical conductivity determines the electrical current between two points (electrodes) of different voltage potentials in a liquid. The conductivity increases as the amount of salt, acid or base contained in a solution increases. Conductivity is measured in units of mS/cm. The scale for water-based solutions starts with pure water (conductivity equals 0.05 µS/cm at 25 °C) and ends with a basic solution of 1.0 mS/cm (e.g., potassium solutions). Potable or surface water has a conductivity value in a range from 0.1 to 1.0 mS/cm.

Conductivity is measured using a measuring cell which consists (in the simplest case) of two similar electrodes. An AC voltage is applied to an electrode and this causes the ions in the solution to move in relation to the electrode. More current flows between the electrodes when more ions are contained in the solution. Using this measured current, the meter calculates the conductance of the solution and then, based on the cell specification, the actual conductivity value.

Areas of applications:
For horticulture, the conductivity value is also referred to as the EC value. The EC value is an indicator for the quantity of dissolved salts. It is specified in mS/cm.

The EC 2000 is used in all areas of cultivation and irrigation systems, including classic floriculture, substrata production and soil-free cultivation. It enables you to monitor basis solutions and nutrient solutions during fertilization. You can also check the salt content in substrata mixtures.

This precise meter can be calibrated to quickly determine the mS/EC value in solutions ranging from 0 – 20 or 200 mS/cm. It features temperature compensation and can be used with carbon or glass/platinum electrodes.

TECHNICAL SPECIFICATIONS:

Measurement range:	Conductivity: 0 to 20 mS/cm with carbon electrode or 200 mS/cm with glass/platinum electrode Temperature: +5 to +45°C
Resolution:	Conductivity: 0.1 mS/cm Temperature: 0.1°C
Precision:	Conductivity: 0 to 20 mS/cm ±2 % 20 to 200 mS/cm ±5 % Temperature: ±0.2°C
Display:	LCD display
Operating temperature:	+5 to +45 °C
Power supply:	One nine-volt battery, size 6LR61
Protection class:	IP40
Dimensions and weight:	125 x 75 x 45 mm, 190 g
Dimensions and weight with case:	350 x 280 x 100 mm approx. 1.6 Kg

Art. No.	
4094	**EC 2000 conductivity meter**
	Base unit without electrode
4095	**EC 2000 Conductivity meter complete with case**
	EC 2000 with carbon conductivity electrode Calibration solution, 1.4 mS/cm and 12.88 mS/cm Beaker, technical manual
4095-P	**EC 2000 Conductivity meter complete with case**
	EC 2000 with glass conductivity electrode, Calibration solution 1.4 mS/cm, 12.88 mS/cm and 111.8 mS/cm beaker, technical manual
	ACCESSORIES
4093	Carbon conductivity electrode
4195	Glass/platinum conductivity electrode
2014	Beaker for measuring volume, 100 ml with cover
1303	Calibration solution, 1.4 mS/cm 100 ml bottle
1308	Calibration solution, 12.88 mS/cm 100 ml bottle
1304	Calibration solution, 111.8 mS/cm 100 ml bottle
3019	One nine-volt battery, size 6LR61

LIQUID MEASUREMENTS

DiST6

EC/TDS pocket tester

The EC/TDS Dist6 pocket tester enables you to monitor the conductivity (EC), TDS and temperature simultaneously. The EC, TDS and temperatures values can all be displayed at the same time.

TDS stands for total dissolved solids (i.e., the total amount of dissolved salts in a solution). The total amount of nutrient salts present in the irrigation water influences the capability of the roots to absorb nutrients. It also has a enduring effect on plant growth. For these reasons, it is important to check the TDS content regularly.

The TDS value is closely related to the conductivity value and is also an indication of water hardness. The EC/TDS pocket tester features a swappable probe, adjustable TDS factor, selectable temperature coefficient (ß), a battery-change display, a stability indicator, automatic shut-off, automatic temperature compensation, a water-proof housing and a HOLD function for freezing measured values.

TECHNICAL SPECIFICATIONS:

Measurement range:	Conductivity: 0 to 20 mS/cm TDS: 0 to 10 g/l Temperature: 0 to +60 °C
Resolution:	Conductivity: 0.01 mS/cm TDS: 0.01 g/l Temperature: 0.1 °C
Precision:	Conductivity: ±2 % of measuring range TDS: ±2 % of measuring range Temperature: ±0.5 °C
Display:	two-character LCD display
Operating temperature:	0 to 50 °C
Power supply:	4 x 1.5 Volt
Run time:	100 hours
Dimensions and weight:	163 x 40 x 26 mm, 85 g
Features:	EC/TDS selectable from 0.45 to 1.00 Temperature coefficient ß selectable 0.0 to 2.4 %/°C waterproof

Art. No.	
4105	**Dist6**
	EC/TDS pocket tester with calibration solution
	ACCESSORIES
1305	Calibration solution, 12.88 mS/cm 20 ml bag

CONDUCTIVITY CHAPTER 3

LIQUID MEASUREMENTS

CD611

EC pocket tester

The CD611 is an inexpensive and pocket-sized EC tester. It takes quick and easy measurements in liquids and filtered soil solutions. It is suitable for use in horticulture, landscaping, aquariums, hydroponics, swimming pools, ponds and in the laboratory.

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 20 mS/cm
Resolution:	0.01 mS/cm
Precision:	±5 % of measuring range
Display:	LCD display
Operating temperature:	+5 to +50 °C
Power supply:	4 x 1.5 Volt
Run time:	approx. 350 hours
Dimensions and weight:	163 x 40 x 26 mm, 85 g

Art. No.	
4092	**CD611**
	EC pocket tester with calibration solution and screwdriver
	ACCESSORIES
1306	Calibration solution, 1.4 mS/cm 20 ml bottle

MULTI 2000

The type-IX advisory kit for measuring pH, activity, conductivity and temperature

The new Multi 2000 integrates all the measuring possibilities of several meters into one instrument: It can take direct measurements of salt content, conductivity, temperature and pH value.

The activity of soils and substrata can also be determined with the Multi 2000 meter.
This activity corresponds to the dissolved total salt content (in grams of salt per litre). The meter measures directly in the plant canopy, the soil, or substratum (i.e., directly at the roots). This gives insight into the potential absorption of nutrient salts by plants while taking all soil characteristics into consideration (such as temperature, moisture and density). The scheduling of fertilization is simplified when periodic activity measurements are carried out. During crop development, you can monitor different soil layers for nutrient availability, long-term fertilizer attributes and deployed fertilizer concentration. The electrical conductivity in a solution can be measured by switching into EC mode and attaching the corresponding temperature-compensated conductivity electrode. You can make a targeted calculation of your fertilizer use by factoring in the EC value of the water you are using. This is the basis for all crop processes that use irrigation-based fertilization, including surface fertilization, dam irrigation, drip irrigation, and also particularly for soil-free crops.

The new microprocessor-controlled Multi 2000 is also useful for providing a quick and reliable check of the pH value. You can use this meter to check the conductive slope (and functionality) of a pH electrode.

The pH glass piercing electrode comes with several diaphragms. Thus it is possible to measure in solutions, substrata, natural soils or mineral wool. A new feature here is the ability to measure the temperature in the field. The temperature is measured in the same place that the pH, activity and conductivity are being monitored (e.g., in the fertilizer solution or in the different potting depths). The temperature probes can be used either in solutions or in substrata. The technical manual includes instructions, guideline tables, usage tips, and the EC values of typical fertilizers.

TECHNICAL SPECIFICATIONS:

Measurement range:	pH: 0 to 14 Activity: 0 to 2 g/l Conductivity: 0 to 200 mS/cm
Resolution:	pH: 0.01 Activity: 0.1 g/l Conductivity: 0.01 mS/cm
Precision:	pH: ±0.02 Activity: ±0.2 g/l Conductivity: ±2 % 0 to10 mS/cm ±5% 10 to 200 mS/cm
Display:	LCD display
Operating temperature:	+5 to +45 °C
Power supply:	One nine-volt battery, size 6LR61
Protection class:	IP40
Dimensions and weight:	180 x 65 mm / 80 x 40/50 mm, 280 g

Art. No.	
1201	**Multi 2000**
	Base unit without electrode
1200	**Advisory kit, type IX**
	MULTI 2000 with pH glass insertion electrode, AM probe (25 cm) with DIN-plug, 4-wire carbon conductivity electrode, pH 4, pH 7, 1,4 mS/cm, 12,88 mS/cm and 111,8 mS/cm solutions, KCl refill solution, $CaCl_2$ powder for analysis of soil solutions, piercing pin, nitrate test strips, beaker, spray bottle with deionised water
1300-M	**Soil advisory kit, type III**
	(features are corresponding with PET 2000 KOMBI) MULTI 2000 with AM probe (25 cm) with DIN-plug, 4-wire carbon conductivity electrode, 1,4 mS/cm, 12,88 mS/cm and 111,8 mS/cm solutions, nitrate test strips, beaker, spray bottle withdeionised water, technical manual
	ACCESSORIES
3011	pH piercing electrode made of glass with 3 diaphragms, 3 mole/l KCl
3012	ph 4.0 buffer solution 100 ml bottle
3013	ph 7.0 buffer solution 100 ml bottle
0504	Calcium chloride ($CaCl_2$) for soil analysis (approx. 11.1 g for 10 l solution 0.01 mole/l)
0505	Calcium chloride ($CaCl_2$) for soil analysis (approx. 100 g)
3022	Refill solution with filler syringe for pH electrodes, 3 mole/l KCl, 100 ml bottle
3017	Dibble
3028	Cap for pH electrodes
1023	AM probe (25 cm) with DIN-plug
4097	4-wire carbon conductivity electrode
2005	Nitrate test strips Box with 100 strips
1303	Calibration solution, 1.4 mS/cm 100 ml bottle
1308	Calibration solution, 12.88 mS/cm 100 ml bottle
1304	Calibration solution, 111.8 mS/cm 100 ml bottle
2014	Beaker for measuring volume, 100 ml with cover
1004	Spray bottle
3019	One nine-volt battery, size 6LR61
4444	Technical manual

LIQUID MEASUREMENTS

7030 ion meter

Multi-channel meter for measuring pH, O_2, conductivity, redox and temperature

The IONOMETER 7030 can simultaneously measure the pH, the redox value, the conductivity, the dissolved oxygen and the temperature of water-based liquids. It is a microprocessor-controlled hand-held meter with a temperature compensation feature. The oxygen channel is also equipped with an air pressure sensor for adjusting the measured values. The display is capable of simultaneously showing all parameters as well as the temperature and pressure of the medium. The calibration process is semi-automatic. The meter also features timer-controlled recording of measurements and an RS232 interface for transmitting data to a PC (for analysis with the optional software). It can be powered either with a rechargeable battery or with a mains power cord.

TECHNICAL SPECIFICATIONS:

Measurement range:	pH: 0 to 14 Conductivity: 0 to 20 mS/cm Redox: –900 to +900 mV rH value: 0 to 42 Temperature: 0 to +50 °C Air pressure: 800 to 1200 hPa O_2-content: 0.1 to 30 mg/l; 0 to 200 % saturation
Resolution:	pH: 0.01 Conductivity: 0.01 mS/cm Redox: 1 mV rH value: 1 Temperature: 0.1 °C Air pressure: 1 hPa O_2-content: 0.1 mg/l; 1 % saturation
Precision:	pH: 0.01 Conductivity: 0 to 5 mS/cm ±1 % 5 to 20 mS/cm ±5 % Redox: 1 mV Temperature: ±0.2 °C O_2-content: ±0.1 mg/l; ±5 % saturation
Display:	LCD points matrix (4 x 20 characters)
Operating temperature:	Operational: 0 to +50 °C Storage: –10 to +50 °C
Power supply:	external power supply unit, Rechargeable battery with integrated charging circuitry
Run time:	> 4 hours
Protection class:	IP40
Dimensions and weight:	225 x 105 x 48 mm, approx. 500 g
Dimensions and weight with case:	380 x 310 x 100 mm approx. 2.5 Kg

Art. No.	
7030	**7030 ion meter, complete with case**
	Base unit with multi-sensor for redox, conductivity and temperature. Incl. integrated plastic pH electrode, oxygen sensor, power supply adapter, solutions (pH 4, pH 10, 2,77 mS/cm, 220 mV, 468 mV), salt for zero-solution oxygen, calibration vessel for 102 % O_2, beaker, oxygen refill solution, replacement oxygen caps
	ACCESSORIES
3061	Plastic pH electrode for ion meter only for liquids, gel electrolyte, custom plug
3064	iVM-H, PC data analysis software
3012	ph 4.0 buffer solution 100 ml bottle
3021	ph 10.0 buffer solution 100 ml bottle
1307	Calibration solution, 2.77 mS/cm 100 ml bottle
4046	Refill electrolyte for oxygen electrode, 25 ml
4047	Salt for zero-solution oxygen, 50 g
4048	Three spare membrane caps for oxygen electrodes
1310	Redox buffer, 220mV 100 ml bottle
1311	Redox buffer, 468mV 100 ml bottle

MULTI-TASK MEASURING INSTRUMENTS CHAPTER 4

LIQUID MEASUREMENTS

Combo

The pocket tester for pH, conductivity and temperature

The Combo pocket tester can take simple and speedy measurements of all key parameters, including the pH, the conductivity (EC or TDS) and the temperature. Temperature compensation is carried out automatically for the pH and EC/TDS measurements. The user can specify the EC/TDS factor between 0.45 and 1.00. The temperature coefficient (ß) can be set in a range from 0.0 to 2.4% per degree Celsius. The HOLD function can be used to keep a measured value on the display. The Combo is housed in a water-proof enclosure and features a large double display. The pH electrode can be swapped out by the user. The EC/TDS probe is very resistant to salt and other aggressive sample mediums.

TDS (total dissolved solids) indicates the sum of the dissolved salts present in a solution. The TDS value is closely related to the conductivity value. The total amount of nutrient salts present in the irrigation water influences the capability of the roots to absorb nutrients. It also has an enduring effect on plant growth. For these reasons, it is important to check the TDS content regularly.

TECHNICAL SPECIFICATIONS:

Measurement range:	Conductivity: 0 to 20 mS/cm TDS: 0 to 10 ppt (g/L) pH: 0 to 14 Temperature: 0 to +60 °C
Resolution:	Conductivity: 0.01 mS/cm TDS: 0.01 ppt pH: 0.01 Temperature: 0.1 °C
Precision:	Conductivity, TDS: ±2% of measurement range pH: ±0.05 Temperature: ±0,5
Display:	Two-character LCD display
Operating temperature:	0 to +50 °C
Power supply:	4 x 1.5 Volt
Run time:	approx. 100 hours
Dimensions and weight:	63 x 40 x 26 mm, approx. 85 g
Features:	EC/TDS selectable 0.45 to 1.00 Selectable temperature coefficient ß 0.0 to 2.4 %/°C waterproof

Art. No.	
3900	**Combo**
	pH/EC/T pocket tester with pH 4, pH 7 and 12.88 mS/cm solutions
	ACCESSORIES
3005	ph 4.0 buffer solution 20 ml bag
3006	ph 7.0 buffer solution 20 ml bag
1305	Calibration solution, 12.88 mS/cm 20 ml bag
3009	Spare pH electrode for the pHep4/ Combo

Type-X advisory kit

For measuring activity, pH and conductivity

The Type-X combination kit consists of three instruments: the PET 2000 for measuring soil activity (in g salt/l); the pH AGRAR 2000 for measuring soil or liquid pH values; and the EC 2000 for measuring the conductivity in liquids.

The PET 2000 allows you to determine the activity or total salt content (in grams of salt per litre) in the soil or substratum. The activity is determined by the amount of dissolved salts contained in the soil. The mobility of the salts is dependent on the humidity, temperature and density of the soil. This allows nutrient salts that are available to plants (such as nitrate or potassium) to be fully measured. This provides you with a concise overview of what nutrient salts are available to plants in the root zone.

The pH AGRAR 2000 is also included for monitoring the pH value. This microprocessor-controlled meter enables you to make quick and precise measurements in solutions such as irrigation water and fertilizer solutions. A glass pH piercing electrode allows you to determine the pH level directly in the soil or substratum. The meter comes with automatic calibration. It displays the electrode conductivity slope for monitoring the glass pH piercing electrode. A warning tone is emitted if the sensitivity level is too low. The sturdy housing is built for the rough conditions of agricultural field work.

The EC 2000 conductivity meter completes this instrument kit. EC value analysis is a critical component in fertilization, soil-free cultivation, closed cultivation, hydroponics, or salt-sensitive crops.

With its ability to measure up to 200 mS/cm, the EC 2000 is also suitable for monitoring basis solutions. It is temperature compensated and equipped with a specific conductivity electrode with integrated temperature probe.

TECHNICAL SPECIFICATIONS:

	pH AGRAR 2000
Measurement range:	0 to 14
Resolution:	0.01
Precision:	±0.02
	EC 2000
Measurement range:	Conductivity: 0 to 20 or 200 mS/cm Temperature: +5 to +45°C
Resolution:	Conductivity: 0.1 mS/cm Temperature: 0.1°C
Precision:	Conductivity: 0 to 20 mS/cm ±2 % 20 to 200 mS/cm ±5 % Temperature: ±0.2°C
	PET 2000
Measurement range:	0 to 2 g/l
Resolution:	0.01 g/l
Precision:	±0.02 g/l
	Type-X advisory kit
Dimensions and weight with case:	450 x 350 x 110 mm 4.2 kg

Art. No.	
1010	**Type-X advisory kit**
	pH AGRAR 2000 with pH piercing electrode made from glass, pH4 and pH7 buffer solutions, KCl refill solution with filler syringe, $CaCl_2$ powder for analysing soil solutions, piercing pin, spray bottle with deionised water, PET 2000 with AM probe (25 cm), 100 nitrate test strips, EC 2000 with carbon conductivity electrode, 1.4 mS/cm and 12.88 mS/cm calibration solutions, technical manual
1010-P	**Type-X advisory kit**
	Similar to the 1010, but with glass/platinum conductivity electrode for up to 200mS/cm
	ACCESSORIES
3011	pH piercing electrode made from glass, with 3 diaphragms, 3 mole/l KCl
3012	ph 4.0 buffer solution, 100 ml bottle
3013	ph 7.0 buffer solution, 100 ml bottle
1004	Spray bottle
3022	Refill solution with filler syringe for pH electrodes, 3 mole/l KCl, 100 ml bottle
3017	Dibble
1003	AM probe (25 cm)
2005	Nitrate test strips Box with 100 strips
4093	Carbon conductivity electrode
4195	Glass/platinum conductivity electrode
1303	Calibration solution, 1.4 mS/cm 100 ml bottle
1308	Calibration solution, 12.88 mS/cm 100 ml bottle
1304	Calibration solution, 111.8 mS/cm 100 ml bottle
2014	Beaker for measuring volume, 100 ml with cover
4444	Technical manual
3019	One spare nine-volt battery, size 6LR61

Type-V advisory kit

Measuring activity and pH

The Type-X combination kit consists of two instruments: the PET 2000 for measuring soil activity (in g salt/l) and the pH AGRAR 2000 for measuring soil or liquid pH values.

The PET 2000 is used for the quick and reliable monitoring of plant nutrients in soils or substrata. It measures the plant's root zone for potential nutrient salt absorption. You can determine immediately whether the total salt content in the root zone is too high, too low or just right. The PET 2000 has a 25-cm AM probe. 50-cm or 75-cm probes are also available (refer to page 7). The device is maintenance-free.

The pH AGRAR 2000 allows you to monitor the pH level with reliability. The glass pH piercing electrode allows you to determine the pH in substrata, soil (in the root zone), in fertilization solutions or in irrigation water.

The pH AGRAR 2000 features automatic pH calibration. It also displays the electrode conductivity slope so you can monitor the pH electrode.

The Type-V combination kit is the perfect companion while working in production facilities, landscaping consulting, earthworks, garden centres, tree care or vegetable crops. All of the kit's instruments are microprocessor-controlled and highly accurate. They are easy to use and custom designed for agricultural applications.

TECHNICAL SPECIFICATIONS:

	pH AGRAR 2000
Measurement range:	0 to 14
Resolution:	0.01
Precision:	±0.02
	PET 2000
Measurement range:	0 to 2 g/l
Resolution:	0.01 g/l
Precision:	±0.02 g/l
	Type-V advisory kit
Dimensions and weight with case:	350 x 450 x 110 mm approx. 3.5 Kg

Art. No.	
1500	**Soil advisory kit, Type V**
	pH AGRAR 2000 with pH piercing electrode made from glass, pH4 and pH7 buffer solutions, KCl refill solution with filler syringe, $CaCl_2$ powder for analysing soil solutions, piercing pin, spray bottle with deionised water, PET 2000 with AM probe (25 cm), 100 nitrate test strips, technical manual
	ACCESSORIES
3011	pH piercing electrode made from glass, with 3 diaphragms, 3 mole/l KCl
3012	ph 4.0 buffer solution, 100 ml bottle
3013	ph 7.0 buffer solution, 100 ml bottle
1004	Spray bottle
3022	Refill solution with filler syringe for pH electrodes, 3 mole/l KCl, 100 ml bottle
3017	Dibble
1003	AM probe (25 cm)
2005	Nitrate test strips Box with 100 strips
2014	Beaker for measuring volume, 100 ml with cover
4444	Technical manual
3019	One spare 9-Volt battery, size 6LR61

Type-VII advisory kit

For measuring pH and conductivity

The Type-VII combination kit consists of two instruments: the ph AGRAR 2000 for measuring pH in soil and liquids and the EC 2000 for measuring conductivity in liquids.

These two instruments are your ideal companions when monitoring the fertilization of hydroponic crops. The pH AGRAR 2000 allows you to monitor the pH. This microprocessor-controlled meter enables you to make quick and precise measurements in solutions such as irrigation water and fertilizer solutions. A glass pH piercing electrode allows you to determine the pH level directly in the soil or substratum. The meter comes with automatic calibration.

It displays the electrode conductivity slope for monitoring the glass pH piercing electrode. A warning tone is emitted if the sensitivity level is too low. The sturdy housing is built for the rough conditions of agricultural field work. The EC 2000 is used to measure conductivity. EC value analysis is a critical component in fertilization, soil-free cultivation, closed cultivation, hydroponics, or salt-sensitive crops.

With its ability to measure up to 200 mS/cm with the glass/platinum conductivity electrode, the EC 2000 is also suitable for monitoring basis solutions. It is temperature compensated and equipped with a specific conductivity electrode with integrated temperature probe.

TECHNICAL SPECIFICATIONS:

	pH AGRAR 2000
Measurement range:	0 to 14
Resolution:	0.01
Precision:	±0.02
	EC 2000
Measurement range:	Conductivity: 0 to 20 or 200 mS/cm Temperature: +5 to +45°C
Resolution:	Conductivity: 0.1 mS/cm Temperature: 0.1°C
Precision:	Conductivity: 0 to 20 mS/cm ±2 % 20 to 200 mS/cm ±5 % Temperature: ±0.2°C
	Type-VII advisory kit
Dimensions and weight with case:	450 x 350 x 110 mm approx. 3.5 Kg

Art. No.	
1700	**Type-VII advisory kit**
	pH AGRAR 2000 and EC 2000 pH AGRAR 2000 with pH piercing electrode made from glass, pH 4 and pH 7 buffer solutions, KCl refill solution with filler syringe, $CaCl_2$ powder for analysing soil solutions, piercing pin, spray bottle with deionised water, EC 2000 with carbon conductivity electrode, calibration solution (1.4 mS/cm and 12.88 mS/cm), technical manual
1700-P	**Type-VII advisory kit**
	Similar to the 1700, but with glass/platinum conductivity electrode for up to 200mS/cm
	ACCESSORIES
3011	pH piercing electrode made from glass, with 3 diaphragms, 3 mole/l KCl
3012	ph 4.0 buffer solution, 100 ml bottle
3013	ph 7.0 buffer solution, 100 ml bottle
1004	Spray bottle
3022	Refill solution with filler syringe for pH electrodes, 3 mole/l KCl, 100 ml bottle
3017	Dibble
4093	Carbon conductivity electrode
4195	Glass/platinum conductivity electrode
1303	Calibration solution, 1.4 mS/cm 100 ml bottle
1308	Calibration solution, 12.88 mS/cm 100 ml bottle
1304	Calibration solution, 111.8 mS/cm 100 ml bottle
2014	Beaker for measuring volume, 100 ml with cover
4444	Technical manual
3019	One nine-volt battery, size 6LR61

NITRAT 2000

2019

"Precision: **very good**"

"Time needed: **5 minutes for preparation and calibration; very minimal for multiple measurements**"

In compliance with the Saxon State Office of Environment, Agriculture and Geology; publication issue 10/2009

2011

NEW

Using an ion-selective electrode for nitrate determination.

This straight-forward, microprocessor-controlled meter uses an ion-selective electrode to measure the nitrate concentration in a liquid. A simple slurry can be made with distilled water in order to measure substrata and soil. Turbidity does not have an effect on the measurement results. Nitrate contents up to 1000 mg/l (ppm) can be accurately measured. This eliminates the possibility of errors caused by dilution. A nitrate combination electrode can be used for the measuring system. The calibration should be carried out with our calibration solution (included).

NITRAT 2000 advisory kit

Advisory kit for simple and quick determination of the nitrate content in the field. The NITRAT 2000 is easy to use and delivers quick reliable results. The meter and accompanying instructions allow you to measure the nitrate content in soil, plants, or organic material. The NITRAT 2000 advisory kit includes all necessary instruments and auxiliary materials. The detailed instructions accompanying the kit describe how to take samples and carry out measurements. They include examples and related reference information.

TECHNICAL SPECIFICATIONS:

Measurement range:	NO_3: 0 to 1000 mg/l
Resolution:	NO_3: 1 mg/l
Precision:	NO_3: ±5 %
Display:	LCD display
Operating temperature:	During operations: +5 to +45 °C
Power supply:	One nine-volt battery, size 6LR61
Run time:	approx. 100 hours
Protection class:	IP40
Dimensions and weight:	125 x 75 x 45 mm, 190 g
Dimensions and weight with case:	350 x 280 x 100 mm approx. 1.8 Kg

Art. No.	
2008	**NITRAT 2000**
	Base unit with nitrate electrode
2019	**NITRAT 2000, complete with case**
	NITRAT 2000 with nitrate electrode calibration solution (500 and 50 mg/l), refill solution (0.1 mole/l KCl) with filler syringe, conditioning solution, extraction solution, beaker, spray bottle with deionised water, manual
2011	**NITRAT 2000 advisory kit**
	NITRAT 2000 with nitrate electrode, calibration solution (500 and 50 mg/l), refill solution (0.1 mole/l KCl) with filler syringe, conditioning solution, extraction solution, beaker, spray bottle with deionised water, electronic precision scale, sampling shovel, 100 folded filters, strainer with drip pan, hand mixer, manual
	ACCESSORIES
2017	Nitrate electrode
2018	Calibration solution, 500 mg/l NO_3, 1 l bottle
2023	Calibration solution, 50 mg/l NO_3, 1 l bottle
2028	Calibration solution, 500 mg/l NO_3, 100 ml bottle
2034	Calibration solution, 50 mg/l NO_3, 100 ml bottle
2027	Refill solution with filler syringe for nitrate electrodes, 0.1 mole/l KCl, 100 ml bottle
2024	Conditioning solution, 100 ml bottle
2035	Salt for 5 l extraction solution/alum
1004	Spray bottle
2036	Extraction solution/alum, 1 l bottle
2014	Beaker for measuring volume, 100 ml with cover
1009	Hand mixer
0810	Strainer, 4 mm / 330 x 190 mm with drip pan
2033	100 folded filters for analysis
2031	Powder funnel, ø 120 mm
3019	One nine-volt battery, size 6LR61

NITROGEN QUICK TEST

Filter beaker

N-min nitrogen quick test

This straight-forward set is used for manually determining the nitrogen content. It includes a filter beaker for outdoor soils and substrate, 50 round filters, 50 nitrate test strips and a 100-ml beaker for measuring volume. Tables and worksheets for N-outdoors, N-substrata and N-sap are also included.

Art. No.	
2000	**Filter beaker for N-min nitrogen quick test**
2001	**Supplemented with pH test strips and tables**

NITROGEN QUICK TEST

AGROS NOVA

Meter for liquid manure

This measuring instrument allows you to determine the nitrogen content in your liquid manure. Measurements can be made in the field or at your farm in a matter of minutes. Our nitrogen measuring system makes targeted manure fertilization possible. The TS and phosphorus content can also be calculated.

Art. No.	
2016	**AGROS NOVA meter for liquid manure**
	AGROS NOVA complete in case, with reagent, pH booster, areometer (density hydrometer) and measuring spoon
	ACCESSORIES
	Areometer hydrometer Reagent, pH booster

NITRATE QUICK TEST

Hand-held sampling pliers

Obtaining plant sap

The hand-held sampling pliers are mainly used for obtaining sap from plant parts and assessing the second N-fertilization for winter grains.

TECHNICAL SPECIFICATIONS:

Material:	Stainless steel Precision manufactured
Weight:	485 g
Length:	170 mm
Compressed surface:	24 x 22 mm

Art. No.	
2007	**Hand-held sampling pliers**

NITRATE AND NITROGEN MEASUREMENT CHAPTER 6

NITRACHEK ADVISORY KIT FOR N/MIN ANALYSIS

Nitrate-nitrogen advisory kit

Determines nitrate content in soil

The nitrate-nitrogen advisory kit allows you to carry out quick on-site tests to determine the nitrate content in fruits and plant material. It is important to determine the correct amount of nitrogen needed at the correct time for your crops.

The instruction manual includes safety tips and practical recommendations for working with soils (N_{min}) with varying depths and when working with water, vegetables, potatoes, grains, corn, sugar beets or grasses. The quantity and quality of your crop will both suffer if you use too little or too much nitrogen. With our nitrate-nitrogen advisory kit, you can accurately determine the proper fertilization schedule for your crops.

Measuring nitrates in fruits, plant materials and soil

Measuring instrument for electronically evaluating the colour scale on Merckoquant nitrate test strips.
The "Nitrachek" system has established itself as an indispensible tool in many countries. New: The previous 20 measurements are saved with date and time stamps. New: Automatic corrective-factor multiplication. When used properly, the Nitrachek delivers results with a statistical stray zone of about ±10 % accuracy. This is a respectable value for this application range.

Art. No.	
2002	**Nitrate-nitrogen advisory kit**
	ACCESSORIES
2009	Nitrachek reflectometer, Measuring instrument for electronically evaluating the colour scale on Merckoquant nitrate test strips
2010	Calibration solution, 100 mg/l nitrate 20 ml bottle
2005	100 nitrate test strips
2006	100 circular filters, ø 150 mm
2030	Wide-neck extraction bottle, 1.0 l, with top
2014	Beaker for measuring volume, 100 ml with cover
2012	Manual / Operating instructions
2550	8 reaction vessels with stands and dosage syringe
0810	Strainer with wooden frames, 4 mm / 330 x 190 mm with drip pan
4060	Manual scale, 0 to 1000 g
2020	Timer
2021	Brush for cleaning strainer
5004	Sampling auger, 30 cm
2040	Beaker, 1 litre, with graduation marks
2022	10 sample beakers
3019	One nine-volt battery, size 6LR61

MEASURING ION CONCENTRATIONS

Ion meter

Measuring NH_4, K, Cu, NO_3, Ca, Na, F, Cl and Ag/S

The ion meter series of single- or multi-channel meters can perform up to five measurements simultaneously. It is possible to measure ion concentrations with up to three of the channels on the meter. The ion meter can also be fitted with channels for measuring pH, conductivity, redox or oxygen. The meter also features a reference electrode and a temperature/pressure sensor (O_2) for compensation. The display shows both the selected parameters and the temperature of the medium being measured. The ion meter is enclosed in a sturdy water-proof aluminium housing. The instrument can be powered either with a rechargeable battery or with a mains power cord. Measurement data can be saved with the AUTO-STORE function. The meter allows you to set the delay time before the first measurement and the measurement interval. The accompanying software makes it easy to export the saved measurements to a PC for further analysis.

The menu-driven calibration process is carried out with the calibration solutions provided. The ion meter is typically used to check discrete components in basis or fertilizer solutions. It can also be used to control the quality of irrigation water, well water, ground water, aquariums, fish farming and sewage treatment plants.

TECHNICAL SPECIFICATIONS:

Possible measurement ranges:	
	Nitrate NO_3: 1.0 to 999.0 mg/l
	Chloride Cl: 1.0 to 999.0 mg/l
	Calcium Ca: 1.0 to 999.0 mg/l
	Ammonium NH_4: 1.0 to 999.0 mg/l
	or 1.0 to 10 g/l
	Fluoride F: 1.0 to 999.0 mg/l
	Copper Cu: 1.0 to 999.0 mg/l
	Sodium Na: 1.0 to 999.0 mg/l
	Potassium K: 1.0 to 999.0 mg/l
	Silver Sulphide Ag/S: 1.0 to 999.0 mg/l
Additionally	pH: 0 to 14
	Conductivity: 0 to 200 µS/cm
	0 to 2 mS/cm
	0 to 20 mS/cm
	0 to 200 mS/cm
	gel. Oxygen O_2: 0 to 200 % saturation
	or 0 to 30 mg/l
	Redox: –1.0 to +1.0 Volt

Art. No.	
7115	**Ion meter 7115 (Cl, T)***
7125	**Ion meter 7125 (Ca, T)***
7140	**Ion meter 7140 (NO_3, T) ***
7150	**Ion meter 7150 (F, T) ***
7182	**Ion meter 7182 (NH_4, T) ***
7190	**Ion meter 7190 (Na, T)***
7024	**Ion meter 7024 (Cl, NO_3, pH, redox, T) ***
7036	**Ion meter 7036 (NH_4, NO_3, O_2, pH, redox, T) ***
7039	**Ion meter 7039 (NH_4, pH, redox, conductivity, T) ***
7045	**Ion meter 7045 (Cl, NO_3, K, pH, conductivity, T) ***
	(* Complete with case) Additional combinations are available on request.
	ACCESSORIES
3064	iVM-H, PC data analysis software

LIQUID ANALYSIS CHAPTER 7

MEASURING ION CONCENTRATIONS

IS intelligent sensors

Measuring NH_4, K, Cu, NO_3, Ca, Na, F, Cl and Ag/S

These intelligent sensors are designed modularly to provide you with more flexibility during stationary water analysis. Intelligent sensors provide an extremely cost-effective solution for almost all water analysis applications that require electrodes. Such applications include the simple, stationary temperature-compensated display of pH, the oxygen monitoring in fish farming, and the measurement of ion concentrations. The display module, CAL-keys module and the relay module are new features. This enables display and calibration in the field without the need for a separate calibrator, laptop or high-level system. Limit-value monitoring and dual-point control are possible when using the relay module. In critical applications, it can be used as an error-status display for showing internal errors which have been detected by the IS.

TECHNICAL SPECIFICATIONS:

Measurement range:	Nitrate NO_3: 0.1 to 3000.0 mg/l
	Chloride Cl: 0.1 to 3.000.0 mg/l
	Calcium Ca: 0.1 to 3000.0 mg/l
	Ammonium NH_4: 0.1 to 3.000.0 mg/l
	Fluoride F: 0.1 to 3000.0 mg/l
	Copper Cu: 0.1 to 3000.0 mg/l
	Sodium Na: 0.1 to 3000.0 mg/l
	Potassium K: 0.1 to 3000.0 mg/l
	Silver Sulphide Ag/S: 0.1 to 3000.0 mg/l
	pH: 0 to 14
	Conductivity: 0 to 200 µS/cm
	0 to 2 mS/cm
	0 to 20 mS/cm
	0 to 200 mS/cm
	gel. Oxygen O_2: 0 to 400 % saturation
	or 0 to 40 mg/l
	Redox: –1.0 to +1.0 Volt

Art. No.	
7410	**IS 7410 complete, for O_2**
7415	**IS 7415 complete, for O2**
7425	**IS 7425 complete, for Ca**
7440	**IS 7440 complete, for NO_3**
7450	**IS 7450 complete, for F**
7465	**IS 7465 complete, for Ag/S**
7482	**IS 7482 complete, for NH_4**
7420	**IS 7420 complete, for conductivity 0 to 20 mS/cm**
7430	**IS 7430 complete, for pH**
	ACCESSORIES
3252	iVM-IS, PC data analysis software

Indicators

Quick test

Our non-bleeding indicator sticks are used for taking quick and easy measurements of various parameters in soil solutions and water.

Additional components or custom packs are available on request.

Custom packs can, for example, include 6 test strips in one bag, 50 bags each with 6 test strips in a can, or 150 bags each with 6 test strip per box.

8202

CUSTOM PACKS

TECHNICAL SPECIFICATIONS:

Measurement range:	Ammonium NH_4
Divisions:	0 –10 – 25 – 50 – 100 – 200 – 400 mg/l
Measurement range:	Calcium Ca
Divisions:	0 –10 – 25 – 50 – 100 mg/l
Measurement range:	Carbonate hardness
Divisions:	0 –3 – 6 – 10 – 15 – 20 °d
Measurement range:	Chloride Cl
Divisions:	0 – 500 – 1000 – 2000 – 3000 mg/l
Measurement range:	Chlorine Cl_2
Divisions:	0 - 0.1 – 0.5 – 1 – 3 – 10 mg/l
Measurement range:	Iron Fe
Divisions:	0 – 2 – 5 – 10 –25 – 50 – 100 mg/l
Measurement range:	Potassium K
Divisions:	0 – 200 – 400 – 700 – 1000 – 1500 mg/l
Measurement range:	Copper Cu
Divisions:	0 – 10 – 30 – 100 – 300 mg/l
Measurement range:	Nitrate NO_3
Divisions	0 – 10 – 25 – 50 – 100 – 250 – 500 mg/l
Measurement range:	Nitrate NO_3 / Nitrite NO_2
Divisions:	0 – 10 – 25 – 50 – 100 – 250 – 500 mg/l
	0 – 1 – 5 – 10 – 20 – 40 – 80 mg/l
Measurement range:	Nitrite NO_2
Divisions:	0 – 1 – 5 – 10 – 20 – 40 – 80 mg/l
Measurement range:	pH test
Divisions:	0 to 14 with 1-pH divisions
Measurement range:	pH test
Divisions:	2 to 9 with 0.5-pH divisions
Measurement range:	Phosphate PO_4
Divisions:	0 – 3 – 10 – 25 – 50 – 100 mg/l
Measurement range:	Water hardness
Divisions:	< 3 > 5 > 10 > 15 > 20 > 25 °d
Measurement range:	Hydrogen peroxide H_2O_2
Divisions:	0 to 25 mg/l
Measurement range:	Zinc Zn
Divisions:	0 – 10 – 25 – 50 – 100 – 250 – 500 mg/l
Multi-sticks for aquarium use:	Total hardness: 5° to 25° d
	Carbonate hardness: 3° to 20° d
	pH: 6.4 to 8.4

Art. No.	
2071	**Ammonium*** (100 tests)
2073	**Calcium*** (60 tests)
2074	**Carbonate hardness** (100 tests)
2072	**Chloride** (100 tests)
2068	**Chlorine** (100 tests) NEW
2075	**Iron*** (100 tests)
2076	**Potassium*** (100 tests)
2077	**Copper** (100 tests)
2085	**Multi-sticks for aquarium use** (100 tests)
2005	**Nitrate Merckoquant** (100 tests)
2069	**Nitrate / Nitrite** (100 tests)
2070	**Nitrite** (100 tests)
8400	**Oiltest** (100 tests)
2083	**pH test 0 – 14** (100 tests)
2084	**pH test 2 – 9** (100 tests)
2078	**Phosphate*** (100 tests)
2082	**Water hardness** (100 tests)
2079	**Hydrogen peroxide** (100 tests)
2080	**Zinc*** (100 tests)
	* Test strips with reagents
	CUSTOM PACKS
8200	**pH test 0 –14** (150 bags, each with 6 test strips)
8202	**pH test 0 –14** (bag with 6 test strips)
8203	**pH soil test kit** (4 bags each with 6 test strips, beaker, 20 circular filters, funnel)
8204	**Nitrate/pH-soiltest-kit** (4 bags Nitrate and pH with 6 test each, beaker, 20 circular filters, funnel)
8302	**Water hardness** (bag with 6 test strips)
8102	**Nitrate** (bag with 6 test strips)
8402	**Oiltest** (bag with 6 test strips)
8602	**Pollutant test** (bag with 6 test strips)
8502	**Indicator-set** (bag Nitrate, water hardness and pH with 6 test stripes each)

FOOD MEASUREMENTS

Refractometer

For wine, honey and fruit juices

Refractometers are precise optical instruments for measuring dissolved materials in water-based solutions. Their functionality is based on the principle of varying optical refraction in liquids: light travels through a liquid and the angle of refraction is measured against a scale. This indicates the quantity of dissolved solids in the liquid.

Its easy to use: simply apply one drop of the sample liquid on the prism and then read the results right away on the scale. The device is very easy to calibrate. The visual focus is adjustable. The refractometer (ATC) is temperature compensated at 20°C.

The MR200ATC is used to determine the must or sugar content in the fruit and wine-making industries. It can also be used to determine the degree of ripening for fruits such as tomatoes, melons or kiwis. The MR90ATC can be used to determine the water and sugar content in honey.

Additional versions are available on request.

TECHNICAL SPECIFICATIONS:

	MR200ATC
Measurement range:	0 to 140 °Oe 0 to 25 °KMWBabo 0 to 32 % Brix
Resolution:	1 °Oe 0.2 °KMWBabo 0.1 % Brix
Precision:	±1 °Oe ±0.2 °KMW Babo ±0.1 % Brix
Dimensions and weight:	175 x 30 mm, approx. 165 g
	MR90ATC
Measurement range:	58 to 90 % 38 to 43 Be' 12 to 27 % water
Resolution:	0.5 % 0.5 Be' 1 %
Precision:	±5 % ±0,5 Be' ±1 %
Dimensions and weight:	175 x 30 mm, approx. 165 g

Art. No.	
4041	**MR200ATC refractometer**
4049	**MR90ATC refractometer**

FOOD MEASUREMENTS

Digital Refractometer

The digital refractometer is an optimal instrument used to measure the specific gravity (in Brix) of water-based solutions (such as fruit juice or wine). It features automatic temperature compensation (ATC). The measurement procedure is simple and quick. After a simple calibration using deionised water, the sample can be measured. The measurement is then displayed within seconds in %Brix.

With the digital refractometer you avoid the measurement inaccuracies that occur with mechanical instruments. It is also quite easy to bring and put to use anywhere on-site.

The temperature is displayed alongside of a battery-change indicator and other helpful information.

Conversion tables for specific gravities (in Oechsle degrees), g/l sugar, alcohol content and KMW/Babo measurements are also included.

TECHNICAL SPECIFICATIONS:

Measurement range:	Brix: 0 to 85% Temperature: 0 to +85 °C
Resolution:	Brix: 0,1 % Temperature: 0.1 °C
Precision:	Brix: ± 0,2 % Temperature: ± 0.3 °C
Operating temperature:	10 to +40 °C
Power supply:	One 9-Volt AA battery
Run time:	approx. 5000 measurements
Protection class:	IP65
Dimensions and weight:	192 x 102 x 67 mm, approx. 420 g

Art. No.	
4045	**Digital Refractometer**

MEASURING DISSOLVED GASES

Oximeter 7110

Measuring dissolved oxygen

The OXIMETER 7110 measures dissolved oxygen in water-based liquids. It is a microprocessor-controlled hand-held meter with a temperature compensation feature. The oxygen channel is also equipped with an air pressure sensor that is used for corrective calculations. The display is capable of simultaneously showing the oxygen concentration, the oxygen saturation, and the temperature and pressure of the medium. The calibration process is semi-automatic. The meter also features timer-controlled recording of measurements and an RS232 interface for transmitting data to a PC (for analysis with the optional software). It can be powered either with a rechargeable battery or with a mains power cord.

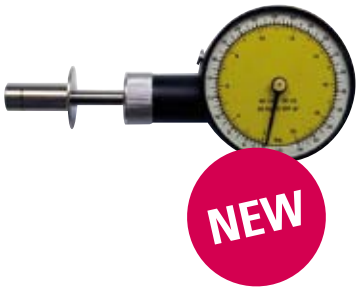
TECHNICAL SPECIFICATIONS:

Measurement range:	O_2: 0.1 to 30 mg/l; 0 to 200 % saturation Temperature: 0 to +50 °C Air pressure: 800 to 1200 hPa
Resolution:	O_2: 0.1 mg/l; 1 % saturation Temperature: 0.1 °C Air pressure: 1 hPa
Precision:	O_2: ±0.1 mg/l; ±5 % saturation Temperature: ± 0.2 °C
Display:	two-character LCD display
Communication:	RS232
Temperature:	Operations: 0 to +50 °C Storage: –10 to +65 °C
Power supply:	external power supply unit, Rechargeable battery with integrated charging circuitry
Run time:	> 6 hours
Protection class:	IP65
Dimensions and weight:	157 x 84 x 30 mm, approx. 300 g
Features:	AUTO-STORE function with adjustable delay time to first measurement and adjustable measuring interval

Art. No.		
7110	**7110 ion meter, complete with case**	
	Base unit with oxygen sensor, temperature sensor, power supply adapter, salt for zero solution, oxygen, calibration vessel for 102 % O_2, refill oxygen solution, spare oxygen caps	
	ACCESSORIES	
4046	Refill electrolyte for oxygen electrode, 25 ml	
4047	Salt for zero-solution oxygen, 50 g	
4048	Three spare membrane caps for oxygen electrode	
3064	iVM-H, PC data analysis software	

MEASURING THE RIPENESS STAGE

Fruit penetrometer



Monitoring the degree of ripeness

The fruit penetrometer is used to monitor the ripeness stage and to check the consistency of the inner fruit flesh. It is very useful in the field for determining the best harvest time. Moreover, it can be used for quality control during storage or after transport. A variety of versions are available for different types of fruit. The standard version can be used for measuring fruits such as apples, pears or citrus. Custom versions (for example, for nuts) are available on request.

TECHNICAL SPECIFICATIONS:

Measurement range:	13 kg or 29 lb
Resolution:	0.1 kg or 0.25 lb
Precision:	± 1% MBE at 20 °C
Puncture tips:	1 cm²
	0.5 cm²
Dimensions and weight:	112 x 59 x 24 mm, approx. 106 g
Dimensions and weight with case:	146 x 74 x 33 mm, approx. 250 g

Art. No.	
4610	**Fruit penetrometer** Base unit with 2 puncture tips, splatter guard, peeler and case

MEASURING FRUIT SIZE

Fruit rings / sorting calibres

4621

4620

Sorting with calibres

Quickly ascertain fruit size with the compartmentalized widths of the sorting calibre.

Art. No.	
4620	**Sorting calibre** 10 – 50 mm
	9 compartments, stainless steel ± 0.5 mm, 5 mm steps
4621	**Sorting calibre** 55 – 120 mm
	14 compartments, stainless steel, ± 0.5 mm, 5 mm steps
4622	**Sorting calibre** 30 – 90 mm
	13 compartments, aluminium 5 mm steps

MEASURING FRUIT SIZE

All-purpose measuring loop

4630

4631

Measuring with the all-purpose loops

All-purpose metal loop with flexible adjustment: for continuously variable measurement of fruit size from 32 mm to 95 mm circumference. With diameter display and pouch included.

All-purpose plastic loop with flexible adjustment: for continuously variable measurement of fruit size from 20 mm to 100 mm circumference.

Art. No.	
4630	**All-purpose measuring loop** 32 mm to 95 mm, metal
4631	**All-purpose measuring loop** 20 mm to 100 mm, plastic

MEASURING FRUIT SIZE

Calibre for sorting asparagus

For measuring asparagus stalks

For measuring the length and thickness of asparagus stalks.

TECHNICAL SPECIFICATIONS:

Measurement precision:	± 0.5 mm
Material:	Plastic
Measuring slots:	3, 6, 8, 10, 12, 14, 16, 18, 20, 26, 36 mm
Length determination:	10, 12, 17, 22, 27 mm

Art. No.	
4640	**Calibre for sorting asparagus**

SOIL MEASUREMENTS

Oxygen lance

Oxygen analysis during composting

In industrial composting plants, oxygen concentrations and temperature must be monitored in order to optimize the decay process. The oxygen lance, equipped with a zirconium oxide sensor, provides reliable measurements of oxygen concentrations in compost. When connected into a control/ventilation system, the lance can be used to control the ventilation of the decaying materials during the intensive rot stage. This ensures that sufficient oxygen is available for the quick and complete aerobic conversion of the material. The ventilator uses very little power and water loss in the rotting material is minimal. As a result, it is possible to skip the time-consuming and costly step of turning over the rotting material. This reduces the amount of disturbing odours. Control system solutions can be designed using the temperature lance together with the programmable GW-SK limit monitor.

TECHNICAL SPECIFICATIONS:

	Oxygen lance
Measurement range:	0.1 to 25 vol.%
Resolution:	12 bit
Precision:	±2 % MBE
Communication:	4–20 mA
Temperature range:	Operations: –10 to +50 °C
Power supply:	24 VDC/ 500 mA
Protection class:	IP54
Dimensions and weight:	1150 x 30 mm, approx. 3.5 kg

Art. No.	
4035	**Oxygen lance**
	ACCESSORIES
4036	GS-SK limit monitor
4037	Temperature lance, 4 – 20 mA/24VDC

AMBIENT AIR MEASUREMENTS

SenseLife

Carbon dioxide, air humidity and temperature measurements

The SenseLife ambient air monitor is a cost-effective meter used for monitoring the humidity and quality of indoor air spaces. All key climatic air parameters are monitored: carbon dioxide (CO_2), air humidity and temperature.

All three measurements are displayed simultaneously. Visual and acoustic alerts are issued when a measurement exceeds a healthy limit. The SenseLife displays the date and time and features a time alarm function.

TECHNICAL SPECIFICATIONS:

	SenseLife
Measurement range:	CO_2: 0 to 10000 ppm Air humidity: 0 to 90 % rel. humidity Temperature: -20 to +50 °C
Precision:	CO_2: ±50 ppm + 5 % MW Air humidity: ±5 % MW Temperature: ± 1 °C
Dimensions and weight:	115 x 108 x 63 mm, 180 g
Power supply:	230 VAC / 60Hz / 5 VDC

Art. No.	
4500	**SenseLife ambient air monitor**

AMBIENT AIR MEASUREMENTS

Carbon dioxide meter

Portable measurement of carbon dioxide

This meter is a precise instrument with dual-channel infrared sensor for measuring carbon dioxide. It is suitable for mobile monitoring of environmental air conditions.

It also allows you to perform long-term monitoring with determination of maximum and average values. It is ideal for monitoring the carbon dioxide (CO_2) concentrations within greenhouses during CO_2 fertilization.

TECHNICAL SPECIFICATIONS:

	Carbon dioxide meter
Measurement range:	0 to 9999 ppm
Precision:	±3 % MBE to 5000 ppm, above: ±4 % MBE
Resolution:	1 ppm
Display:	two-character LCD display
Operating temperature:	0 to +50 °C
Power supply:	One nine-volt battery, size 6LR61
Run time:	6 hours
Dimensions and weight:	190 x 57 x 42, 300 g

Art. No.	
4344	**Carbon dioxide meter**
	ACCESSORIES
4034	TOP-SAFE protects against dirt and impact
4039	Log printer

PROCESS MEASUREMENTS

SSM6000

Biogas analyser for CH_4, H_2S, O_2 and CO_2

The SSM6000 has been designed specifically for the non-continuous analysis and periodic process monitoring of gases resulting from biological processes (such as biogas, sewage gas or landfill gas). It measures and displays all critical gas types, including methane and carbon dioxide (infrared), hydrogen sulphide and oxygen (electro-chemical). The analyser features an integrated measurement-gas preparation. It is enclosed in a wall-mount housing. Besides the illuminated LCD screen, it also has a four-character LED status display for each type of gas measured.

The SSM6000 LT (H_2S max 1000 ppm) is well suited for routine and cost-effective monitoring procedures.

TECHNICAL SPECIFICATIONS:

Measurement range:	CH_4: 0 to 100 vol.% CO_2: 0 to 100 vol.% O_2: 0 to 25 vol.% H_2S: 0 to 5000 ppm
Resolution:	CH_4: 0.1 vol.% CO_2: 0.1 vol.% O_2: 0.1 vol.% H_2S: 1 ppm
Display:	4-character LED display, status screen, 4-character LCD display
Communication:	RS232, 4–20 mA
Operating temperatures:	+5 to +40 °C
Power supply:	AC 85-264 VAC, 47-63 Hz
Protection class:	IP40
Dimensions and weight:	300 x 400 x 165 mm, approx. 10 kg
Options:	Profibus DP, multiple measuring points, hydrogen H_2 (instead of CO_2)
Features:	Data storage capabilities

Art. No.	
6004	**SSM6000 for CH_4, H_2S, O_2 and CO_2**
6003	**SSM6000 for CH_4, H_2S and O_2**
6002	**SSM6000 for CH_4 and H_2S**
6012	**SSM6000 LT for CH_4 and H_2S**

Additional configurations and options available on request

GAS ANALYSIS CHAPTER 9

ENVIRONMENTAL AND PROCESS MEASUREMENTS

Analysis systems

Customer-specific gas analysis systems

PRONOVA produces analysis systems, custom analysers, sensors and components for application-specific gas analysis tasks. This includes analysis systems for process analysis, emissions monitoring, biogas or motor/exhaust gas removal systems.

This photograph shows a two-way monitoring system for carbon monoxide (CO) and nitric oxide (NO_x). This unit is used to monitor the post-catalytic exhaust emissions at the cogeneration power plant of an industrial greenhouse facility. The cleaned emissions are then routed back into the greenhouse and used as carbon dioxide fertilization.

Art. No.	
	Analysis systems

MEASURING THE ILLUMINATION STRENGTH

Lux meter

The Lux meter is a high-precision digital light meter with three different measuring ranges. The sensor connects to the meter using a stretchable spiral cable which allows you to easily take precise point measurements.

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 2000 lx / 20000 lx / 50000 lx
Resolution:	1 lx, 10 lx, 100 lx
Precision:	±5 % +2 dig.
Display:	LCD display
Measurement time:	0.4 seconds
Sensor output voltage:	0.1 mV per 10 lx
Moisture range:	max. 80 % rel. humidity
Power supply:	One nine-volt battery, size A23
Run time:	approx. 200 hours
Dimensions and weight:	188 x 64.5 x 24.5 mm, 160 g

Art. No.	
4050	**Lux meter** light manual stat manual

Lux Multi

The professional Lux Multi measures four different forms of light: sun light, fluorescent lamp light, sodium-vapour lamp light and mercury-vapour lamp light. The meter features a min/max/average function, a hold function, and a zero-compensation function.

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 2000 lx / 20000 lx / 100000 lx
Resolution:	1 lx, 10 lx, 100 lx
Precision:	±5 % +2 dig.
Display:	LCD display
Operating temperature:	0 to +50 °C
Moisture range:	max. 80 % rel. humidity
Power supply:	One nine-volt battery, size 6LR61
Dimensions and weight:	180 x 72 x 23 mm, approx. 335 g

Art. No.	
4054	**Lux Multi** light manual stat manual

Lux Quantum

For monitoring the photosynthetic radiation accessible to plants in wave lengths ranging from 400 to 700 λ. Since roofing material has a physiological influence on flower colour and plant growth, light monitoring plays a key role in managing the growth of indoor crops and plants.

TECHNICAL SPECIFICATIONS:

Measurement range:	0–2000 µmol/m²s (for λ: 400–700 nm)
Display:	LCD display
Operating temperature:	0 to +50 °C
Sensor output voltage:	0.1 mV per 10 lx
Power supply:	1 nine-volt battery, size 6LR61
Run time:	approx. 200 hours
Dimensions and weight:	150 x 75 x 25 mm, 130 g

Art. No.	
4055	**Lux Quantum Meter** light manual stat manual

RAIN GAUGE

Hellmann

Prof. Hellmann rain gauge

An internal graduated cylinder is used to measure precipitation. It has a scale from 0 to 25 mm. This corresponds to the quantity of rain in litres that has fallen on a square meter of surface.

One mm of precipitation corresponds to a quantity of 1 litre/m².

Art. No.	
4110	**Prof. Hellmann rain gauge**
	ACCESSORIES
4150	Graduated cylinder insert

RAIN GAUGE

Wireless rain and temperature monitor

NEW

Rain monitor with wireless rain gauge

Wireless rain monitor for wireless transmission of rain quantity and temperature (max. 30 m range). The rain monitor empties itself automatically. The display shows the total rain quantity since the last reset, the rain quantity in the previous hour and previous 24 hours, and the last time of rain. A bar graph on the display shows rain over the last 7 days, weeks or months. There is also a temperature and rain alarm function with time/date.

TECHNICAL SPECIFICATIONS:

Measurement range:	Rain quantity: 0 to 9999 mm
Indoor temperature:	-10 to +50 °C
Outdoor temperature:	-50 to +70 °C
Power supply:	3 or 2 1.5-Volt AA batteries
Dimensions and weight:	122 x 94 x 25 mm ø x h: 132 x 160 mm, 630 g

Art. No.	
4190	**Wireless rain monitor**

WIND GAUGE

Skywatch

Anemo-thermometer

Displays the current wind speed and temperature. Selectable wind speed in units of either km/h, mph, m/s, fps or knots. Temperature in °C or °F.

TECHNICAL SPECIFICATIONS:

Measurement range:	Wind speed: 0 to 150 km Temperature: –50 to +100 °C
Resolution:	Wind speed: 0.1 km/h Temperature: 0.1 °C
Precision:	Wind speed: ±3 % Temperature: ± 0.3 °C
Dimensions and weight:	38 x 88 x 10 mm, 28 g

Art. No.	
4240	**Wind gauge**

SOIL MEASUREMENTS

Hydro 2000

Measuring the volumetric soil moisture

The Hydro 2000 meter uses an external soil moisture sensor to determine the soil moisture. The sensor works according to the principle of frequency domain reflectory (FDR); it calculates the volumetric soil humidity (in m^3 Water/m^3 soil) using the changing relative permittivity. The system is not sensitive to salinity and has high temperature stability. Its impact on the soil is also minimal.

The HH-2 (refer to the illustration below) can be optionally connected to the soil moisture sensor. This enables you to save and analyse measurement data. You can design simple irrigation systems if you also use the GP1 data logger (refer to the illustration below). The programmable relay output on this unit allows it to intelligently activate and shut off the irrigation.

TECHNICAL SPECIFICATIONS:

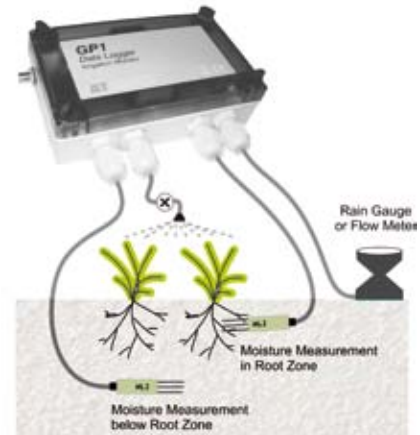
Measurement range:	0 to 60 %
Resolution:	0.1 %
Precision:	±3 %
Display:	Digital display 12 mm
Operating temperature:	Operations: +5 to +45 °C
Power supply:	One nine-volt battery, size 6LR61
Protection class:	IP40
Dimensions and weight:	125 x 75 x 45 mm, 190 g

Art. No.	
8040	**Hydro 2000, complete with case**
	Hydro 2000 with soil humidity sensor and additional accessories
8046	**HH2, complete with case**
	HH2 with soil humidity sensor and additional accessories
8048	**GP1 data logger**
	ACCESSORIES
8042	Soil humidity sensor

MOISTURE ANALYSIS CHAPTER 12

SOIL MEASUREMENTS

WET sensor



Measuring soil moisture, conductivity and temperature

The WET sensor can simultaneously measure the volumetric soil humidity, the conductivity of the interstitial pore water and the temperature. The sensor works according to the principle of frequency domain reflectory (FDR); it calculates the volumetric soil humidity (in m^3 Water/m^3 soil) using the changing relative permittivity. The system is not sensitive to salinity and has high temperature stability. Its impact on the soil is also minimal.

The WET sensor can be connected to the HH-2 portable analysis unit. This enables you to save and analyse measurement data. You can design simple irrigation systems if you also use the GP1 data logger. The programmable relay output on this unit allows it to intelligently activate and shut off the irrigation. Two WET sensors can be connected.

TECHNICAL SPECIFICATIONS:

Measurement range:	volumetric soil humidity: 0 to 60 %
	Conductivity: 0 to 0.5 mS/cm
	Temperature: 0 to +40 °C
Precision:	Volumetric soil humidity: ±2 to 4 %
	Conductivity: ±5 %
	Temperature: ± 1°C
Temperature:	Operations: 0 to 40 °C
Protection class:	IP67
Dimensions and weight:	125 x 45 x 10 mm, 75 g

Art. No.	
8050	**WET sensor**
8047	**HH2, complete with case**
	HH2 with WET sensor and additional accessories
8048	**GP1 data logger**

SOIL MEASUREMENTS

BWK lance

Monitoring soil water

The BWK measures with a shielded, volumetric capacity-high-frequency technique whereby the water and soil volume density are both used to determine the soil moisture content. Because soil density can vary within a soil layer, a single measurement can only be used to indicate the moisture tendency. Multiple measurements at the same soil layer are necessary in order to calculate a meaningfully accurate value.

The temperature, pH value and salt content do not influence these measurements. The BWK lance delivers quick and simple results. It features a strong, sturdy lance made of stainless steel. The display shows customized colour scales for sand, loam and clay.

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 100 %
Insertion depth:	max. 750 mm
Power supply:	One nine-volt battery, size 6LR61
Dimensions and weight:	320 x 920 x 145, 1.4 kg

Art. No.	
9000	**BWK lance**
	Aluminium housing, stainless steel probe with markings

MOISTURE ANALYSIS CHAPTER 12

SOIL MEASUREMENTS

Tensiometer

Analogue measurement of the suction tension

A tensiometer is used to measure suction tension. The porous cell of the tensiometer uses capillary action to transport water outwards into the drier soil. A negative pressure is then created within the closed pipe. This negative pressure is an indication of the moisture. Suction tension is a force measuring the tension with which the water is held to the soil or its availability. Plant roots must expend this force in order to absorb water. The decisive factors in creating this force are the fine pores and capillaries in the soil. This soil characteristic which the tensiometer measures is critical for plant growth. One advantage this instrument has over electrical meters is that it does not need to be calibrated.

The value of the suction tension increases as long as the substratum is capable of transferring the water and as long as the moisture differential is maintained. If the surroundings become more moist, the the process reverses itself. Close contact with the substrate is needed to get a quick tensiometer reaction and to get a value for certain soil and substratum types.

The tensiometer has a measuring range from 0 to 600 mbar negative pressure. It comes optionally with an analogue pressure manometer (the Tensiometer Classic) or with a digital pressure sensor (the Tensiometer Digital). Additional versions and lengths are available on request.

Art. No.	
	Tensiometer Classic
8059	Length: 20 cm
8060	Length: 30 cm
8061	Length: 60 cm
8062	Length: 100 cm
	Tensiometer Digital
8070	Length: 33 cm
8071	Length: 53 cm
	ACCESSORIES
8066	10 flat seals
8067	10 o-ring seals
8001	Manometer Tensiometer Classic
8075	Pressure sensor tensiometer digital

MOISTURE DATA LOGGER

Data logger

Measures the relative ambient humidity

Moisture and temperature logger with internal sensor (refer also to page 34).

TECHNICAL SPECIFICATIONS:

	Model 175-H1
Measurement range:	Temperature: –20 °C to +55 °C Air humidity: 0 to 100 % rel. humidity
Resolution:	Temperature: 0.1 °C Air humidity: 1 % rel. humidity
Precision:	Temperature: ±0.4 °C Air humidity: ± 2.0% rel. humidity +0,03%rF/K
Data storage capacity:	1 million measured values
Measuring interval range:	adjustable 10 s to 24 h
Operating temperature:	–20 °C to +55°C
Power supply:	3x AlMn Typ AAA
Run time:	approx. 3.0 years with a 15-min. measuring interval
Dimensions:	149 x 53 x 27 mm

Art. No.	
4320-N	**175-H1 data logger**

MEASUREMENTS IN BULK SOLIDS

Insertion hygrometer

Measuring the relative humidity

The insertion hygrometer is mainly used for agricultural applications. It is used, for example, to determine the humidity when working with grain crops. The hygrometer can be put anywhere and positioned either horizontally, vertically or tilted diagonally. Specification charts are available for: cotton, grass seeds, hay, wood, corn, rapeseed, rice, a variety of grains, and more.

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 100 % rel. humidity
Housing:	Stainless steel 1.4301
Sleeve:	Stainless steel 1.4301
Hand grip:	Screw-in, brass
Probe diameter and length:	23 mm, 500 mm
Operating temperatures:	up to 80 °C, short-term up to 120 °C
Measuring system:	Hygro element
Quality category:	2.5

Art. No.	
9100	**Insertion hygrometer** Probe length: max. 1 m, other lengths available on request

MEASUREMENTS ON SOLID OBJECTS

Material moisture meter

Measures moisture in wood and construction material

This meter is ideal for monitoring construction material moisture levels directly at the construction site. Its speedy and reliable – just take off the cap and stick the measurement electrode in the object being measured. The meter has a measurement scale specifically for wood and construction materials. It also features an automatic test function.

TECHNICAL SPECIFICATIONS:

Measurement range:	Wood: 6 to 44 % Construction materials: 0.2 to 2.0 %
Precision:	Wood: ±1 % Construction materials: ±0.05 %
Measurement technique:	Electrical resistance
Electrode length:	8 mm
Battery:	Three 1.5-volt batteries, size CR2032
Dimensions and weight:	130 x 40 x 21 mm, approx. 100 g

Art. No.	
9150	**Material moisture meter** with bag and mounting clip

MOISTURE ANALYSIS CHAPTER 12

AMBIENT MEASUREMENTS

Hygrometer with indoor/outdoor thermometers

Measuring air humidity and temperature

Wall hygrometer with indoor/outdoor thermometers and minimum/maximum feature. All values can be displayed at the press of a button. The external temperature sensor is about 3 m long. The display can switch between °C and °F.

TECHNICAL SPECIFICATIONS:

Measurement range:	Indoor temperature –10 to +50 °C Outdoor temperature: –50 to +70 °C Air humidity: 25 % to 98 % rel. humidity
Power supply:	One 1.5-Volt, AA size battery

Art. No.	
4025	**Hygrometer with indoor/outdoor thermometers**

AMBIENT MEASUREMENTS

Pocket hygrometer with thermometer

Measures air humidity and temperature

This pocket meter measures temperature and humidity. It saves the minimum and maximum temperature and humidity values. It features a fast-update display and is suitable for use in refrigerated warehouses, greenhouses, etc. It can display in either °C or °F.

TECHNICAL SPECIFICATIONS:

Measurement range:	Temperature: –20 to +50 °C Air humidity: 10 % to 95 % rel. humidity
Resolution:	Temperature: 0.1 °C Air humidity: 1 %
Precision:	Temperature: ±1 °C Air humidity: ±5 % for 30 to 80 % rel. humidity otherwise 7 %
Dimensions and weight:	150 x 20 x 16 mm, 40 g

Art. No.	
4027	**Pocket hygrometer with thermometer**

AMBIENT MEASUREMENTS

High-precision hair hygrometer

Measuring air humidity

This highly precise hair hygrometer measures the relative air humidity. The instrument features a silver-coloured, chrome-steel housing. It has an easy-to-read diameter of 103 mm and is ranked "very good" by the Stiftung Warentest, a leading German consumer testing association.

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 100 % rel. humidity
Scale divisions:	1 % rel. humidity
Precision:	±3 %
Operating temperature:	–35 to +65 °C
Dimensions and weight:	ø 103 mm, 80 g

Art. No.	
4033	**High-precision hair hygrometer**

WEATHER STATION WITH DATA LOGGER

Professional weather station

Measures temperature, humidity (for soil, foliage and air), rain quantity, light, wind strength, wind direction and air pressure

Up to 15 sensors can be connected to the professional weather station / data logger. This allows all pertinent weather data to be recorded and saved. The sensors can be added, removed and swapped to suit your particular applications. No complex programming or calibration is necessary, since the data logger recognizes these sensors automatically. The non-volatile EEPROM memory ensures the safety of your data during a power or battery outage.

There are ten input channels. These can optionally be expanded to 15 by using an adapter. The entire contents of the 512K memory can be exported in 2.5 minutes. LED lights show operational and battery status. The unit can be mounted on a pole (with max. ø 38 mm) or directly on a wall.

TECHNICAL SPECIFICATIONS:

Measurement intervals:	1 s to 18 h / +20 °C to +50 °C (with alkaline batteries)
Communication port:	RS232
Memory:	500000 measurements total (512K)
Run time:	approx. 1 year
Protection class:	weather-proof
Dimensions and weight:	180 x 230 x 100 mm, 900g

FOOTNOTES

[1]) – 40 to +75 °C
[2]) – 40 to +75 °C, 0 to 100% rel. humidity
[3]) 0 to 0.40 m^3/m^3
[4]) max 10 cm/h
[5]) 0 to 2500 µmol/m^2/s
[6]) 0 to 1280 W/m^2
[7]) 0 to 45 m/s
[8]) 0 to 44 m/s, 0 to 358°
[9]) 660 to 1070 mbar
[10]) 0 to 100 %

Art. No.	
	Professional weather station, data logger
4700	for 4 sensors
4701	for 10 sensors
	Sensors
4702	Temperature sensor [1]
4703	Temperature/air humidity sensor [2]
4704	Soil humidity sensor [3]
4705	Rain gauge [4]
4706	Light (photosynthetic) sensor [5]
4707	Light sensor [6]
4708	Wind speed sensor [7]
4709	Wind speed/direction sensor [8]
4710	Air pressure sensor [9]
4711	Foliage moisture sensor [10]
	ACCESSORIES
4712	Software with serial cable

WEATHER STATIONS CHAPTER 13

WIRELESS RADIO STATION

Wireless weather station with touchscreen

Measures temperature, air humidity, rain quantity, wind strength, wind direction and air pressure

Wireless weather station with touchscreen, and including PC software for analysing weather data on a PC. Simple to use with touchscreen and large display (85 x 160 mm). With four solar-powered outdoor sensors.

One solar-driven outdoor sensor each for temperature, air humidity, wind direction/strength, rain quantity. Also an indoor sensor for measuring temperature, air humidity and air pressure with display icons.

The wind-chill factor and the dew point are also calculated. Three additional sensors (thermo-/hygrosensors and water sensor) are available separately.

The transmission range is 100 metres (at 433 MHz). Wireless clock with calendar. Analysis and graphical display of weather data on PC, with PC software and RS232. Hardware/software requirements:
- Windows 95, 98, NT 4.0, 2000, ME, XP
- at least 10 MB of free space on the hard drive
- 8 MB RAM
- a serial port

TECHNICAL SPECIFICATIONS:

Power supply:	Base unit: Power supply (included), four 1.5-V AA batteries Sensors: solar cells, four 1.5-V AA size
Dimensions:	Base unit: 139 x 204 x 39 mm
Measurement range:	Indoor temperature: –5 °C to +50 °C Outdoor temperature: –20 °C to +60 °C Air pressure: 795 to 1050 mbar Air humidity: 25 % to 90 % rel. humidity Wind speed: 0 to 56 m/s Wind direction: 0 ° to 359 ° Rain quantity: 0 to 9999 mm and mm/h
Resolution:	Temperature: 0.1 °C Air pressure: 1 mbar Air humidity: 1 % rel. humidity Wind speed 0.2 m/s Wind direction 1 ° Rain quantity: 1mm/h

Art. No.	
4210	**Wireless weather station with touchscreen** Wireless weather station with touchscreen, software, indoor sensor (for temperature, air humidity and air pressure), outdoor sensors for temperature, humidity, wind direction, wind speed, and rain gauge.
	ACCESSORIES
4211	Thermo/Hygrosensor for 4210
4212	Water sensor for 4210

WIRELESS RADIO STATION

Intelligent wireless weather station with forecasting index

NEW

Forecast system in text form with index, adjustable outdoor temperature alarm

Wireless weather station with up to max. three transmitter for temperature and humidity (max. 100m). completely new forecast system in text form with index for fog, snow, glazed frost, tempest and storm, forecast of the minimum night temperature, time and probability of forecast, transmission of outdoor temperature and humidity.

Indication of indoor temperature and humidity with comfort level, maximum and minimum values with time and date of recording (text form), symbols for actual weather and forecast, tendency of atmospheric pressure, atmospheric pressure with bar graph indication of the last 12 hours, outdoor temperature alarm , radio controlled clock with date. Adjustable outdoor temperature alarm (channel 1).

TECHNICAL SPECIFICATIONS:

Power supply:	Base unit: 3 x 1,5 V, AA size
	Transmitter: 2 x 1,5 V, AA size
Dimensions and Weight:	
	Base unit: 175 x 120 x 30 mm, 660 g
	Transmitter: 160 x 43 x 28 mm
Measuring range:	Indoor temperature: -10 °C to +60 °C
	Outdoor temperature: -40 °C to +60 °C
Humidity:	1 to 99 % rel. humidity
Resolution:	Temperature: 0,1 °C
Humidity:	1 % rel. humidity

Art. No.	
4222	**Intelligent wireless weather station with forecasting index**
	wireless weather station with one transmitter for temperature and humidity
4223	**Individual transmitter for temperature and humidity**

WEATHER STATIONS CHAPTER 13

WIRELESS RADIO STATION

Wireless weather station with frost warning function

NEW

4255

4221

Measures temperature and air humidity

Wireless weather station with frost warning, consisting of weather station and radio-controlled clock. Weather forecast with animated icons for sunny, partly cloudy, cloudy, rainy and snow. Radio receiver for temperature data, transmitted from up to three sensors (indoors, outdoors, with max. unobstructed range of 30 m). Storage function for saving temperature and air humidity data. With frost warning: flashing LED when outdoor temperature is between 3°C and 2°C (only on channel 1).

TECHNICAL SPECIFICATIONS:

Power supply:	Base unit: three 1.5-V AA batteries
	Sensors: one 1.5-V AA battery
Dimensions and weight:	Base unit: 164 x 94 x 49 mm
Display range:	Indoor temperature: -5 °C to +50 °C
	Outdoor temperature: -20 °C to +60 °C
	Indoor air humidity: 25 to 95 % rel. humidity
Resolution:	Temperature: 0.1 °C
	Indoor air humidity: 1 % rel. humidity

Art. No.	
4221	**Wireless weather station with frost warning function**
	Wireless weather station and one wireless transmitter for temperature
4255	**Individual wireless transmitter for temperature**

ANALOGUE THERMOMETER

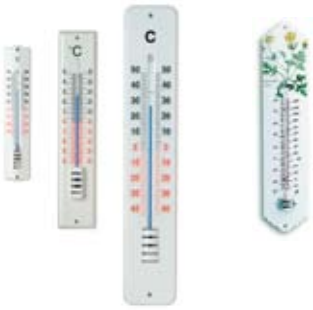
Min/max thermometer

Min/max thermometer with easy-to-read scale, in aluminium or plastic. Measurement range from –38 to +50 °C. Mercury free.

Art. No.	
4070	**Min/max thermometer**
	Black scale, 220 x 60 mm, 150 g
4010-G 4010-W	**Min/max thermometer, green or white**
	230 x 79 mm, 120 g

ANALOGUE THERMOMETER

Gardener thermometer



The metal gardener thermometer comes with an easy-to-read scale in a variety of sizes. Measurement range from -40 to +50 °C or –35 to +65°C (4079).

Art. No.	
4019	**Gardener thermometer**
	205 mm x 40 mm, 60 g
4059	**Gardener thermometer**
	280 mm x 58 mm, 150 g
4017	**Gardener thermometer**
	450 mm x 80 mm, 130 g
4079	**Enamel thermometer up to 65°C**
	290 mm x 63 mm, 170 g

ANALOGUE THERMOMETER

Insertion thermometer

Waterproof (splash water) insertable bi-metal thermometer with stainless steel measuring rod and rod holder.

TECHNICAL SPECIFICATIONS:

Display:	–20 °C to +100 °C, ø 25 mm
Measuring rod:	120 mm, ø 3.8 mm

Art. No.	
4225	**Insertion thermometer**

TEMPERATURE MEASURING SYSTEMS CHAPTER 14

ANALOGUE THERMOMETER

Frost monitor

Contact thermometer with contact relay

Adjustable contact thermometers with rotary magnets are widely used in greenhouses, refrigeration rooms, computer data centres and storage cellars. The thermometer may be used either as a continuous temperature-control mechanism or as a warning system to monitor the upper and lower temperature limits.

A nickel-plated brass frame encloses the thermometer. The frame length is 250 mm with a 24-mm diameter. Wall fixtures are included and a rail mounted to the frame protects the glass component of the thermometer. The thermometer features two scales. The upper scale is the setting scale and the lower section contains a temperature display scale. As soon as the mercury reaches or goes below the set temperature, the contact opens (or closes). A warning device or system is then switched on (or off) via the relay. The measurement range is from –10 °C to +70 °C.

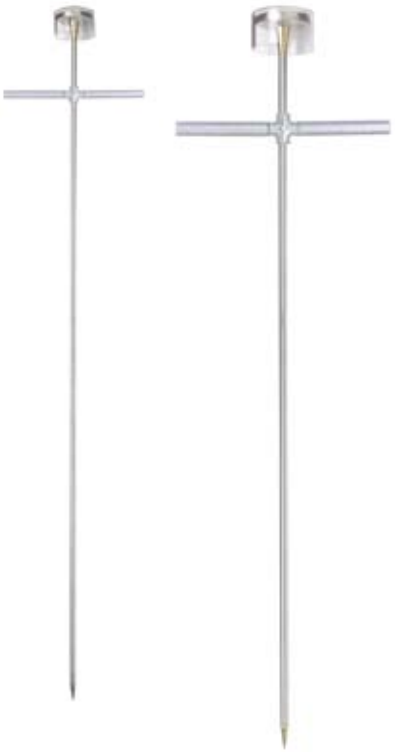
High-precision fixed-contact thermometers are well suited for monitoring a specific temperature range in horticulture, agriculture and fruit crops. They feature a permanent fused-on contact and a plug-in connection. The plug connection allows you to swap thermometers at any time. A relay is used to connect to an alarm transmitter which can then send alerts to the operator. The units are manufactured depending on the specific switching temperature required for the application.

A range of up to 2000 metres can be obtained when using Liycy cables (2 x 0.5 mm²) or PVC control cables.

Art. No.	
4072	**Adjustable contact thermometer**
4082	**Fixed-contact thermometer** (Please specify temperature when ordering)
4073	**Contact relay with 230 VAC**
4076	**100 m Liycy cable**

ANALOGUE THERMOMETER

Compost thermometer



Bi-metal thermometer for depth measurements

Bi-metal thermometer for long-term stationary measurements in compost or piles. Designed with measurement probe and handles.

Other measurement ranges and lengths (up to 4 m) are available on request.

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to +120 °C
Precision:	Class 1 (1 %)
Display:	ø 80 mm
Measuring rod:	ø 13 mm

Art. No.	
4051	**Bi-metal thermometer 0.5 m 0 to + 120 °C**
4006	**Bi-metal thermometer, 1.0 m 0 to +120 °C**
4007	**Bi-metal thermometer, 1.5 m 0 to +120 °C**
4078	**Bi-metal thermometer 2.0 m 0 to + 120 °C**

ANALOGUE THERMOMETER

Bi-metal thermometer

Bi-metal thermometer for ground and vapour measurements

Bi-metal thermometer for long-term stationary ground measurements from –20 to +60 °C. Extended temperature range (from 0 to +120 °C for vapour measurements) also possible. Featuring a stainless steel measuring rod ø 6 mm and display ø 50 mm. Other measurement ranges and lengths are available on request.

TECHNICAL SPECIFICATIONS:

	Ground thermometer
Measurement range:	–20 to +60 °C
Precision:	Class 1 (1%)
Display:	ø 50 mm
Measuring rod:	ø 6 mm
	Vapour thermometer
Measurement range:	0 to +120 °C
Precision:	Class 1 (1%)
Display:	ø 50 mm
Measuring rod:	ø 6 mm

Art. No.	
4001	**Ground thermometer 200 mm, –20 to +60 °C**
4002	**Ground thermometer 300 mm, –20 to +60 °C**
4003	**Ground thermometer 400 mm, –20 to +60 °C**
4004	**Ground thermometer 500 mm, –20 to +60 °C**
4016	**Vapour thermometer 300 mm, 0 to +120 °C**
4005	**Vapour thermometer 500 mm, 0 to +120 °C**

ANALOGUE THERMOMETER

Bi-metal thermometer

Bi-metal thermometer is protected against splashed water

Waterproof (splash water) bi-metal thermometer for long-term stationary ground measurements, in the range –20 to +60 °C. Featuring stainless steel measuring rod ø 6 mm and display ø 63 mm. Other measurement ranges and lengths are available on request.

TECHNICAL SPECIFICATIONS:

	Ground thermometer
Measurement range:	–20 to +60 °C
Precision:	Class 1 (1%)
Display:	ø 63 mm
Measuring rod:	ø 6 mm
Features:	waterproof (splash water protection)

Art. No.	
4205	**Bi-metal thermometer 200 mm, –20 to +60 °C**
4206	**Bi-metal thermometer 300 mm, –20 to +60 °C**
4207	**Bi-metal thermometer 400 mm, –20 to +60 °C**
4208	**Bi-metal thermometer 500 mm, –20 to +60 °C**

DIGITAL THERMOMETER

Min/max thermometer

Measures the indoor and outdoor temperature

This wall thermometer with min/max function can simultaneously display the time and indoor and outdoor temperatures. All values can be displayed at the press of a button. The external temperature sensor is about 3 m long. The display can switch between °C and °F.

TECHNICAL SPECIFICATIONS:

Measurement range:	Indoor temperature: –10 to +50 °C Outdoor temperature: –50 to +60 °C
Power supply:	One 1.5-Volt, AA battery

Art. No.	
4022	**Min/max thermometer** with indoor and outdoor thermometers

DIGITAL THERMOMETER

Digital thermometer

Measures with insertion probe

Waterproof, digital all-purpose thermometer with insertion probe and approx. 60 cm cable. With table stand and mounting clip. Max/min and hold functionality. Switchable between °C and °F.

TECHNICAL SPECIFICATIONS:

Measurement range	–40 to +200 °C
Resolution:	0.1 °C
Precision:	+/–1 °C
Protection class:	IP65
Dimensions and weight:	95 x 60 x 18 mm (without probe), 130 g

Art. No.	
4024	**Digital thermometer with insertion probe**

DIGITAL THERMOMETER

Digital thermometer

Measures with insertion probe

This quick, insertable digital thermometer with min/max function comes with a protective sheath and clip.

TECHNICAL SPECIFICATIONS:

Measurement range:	–50 to +150 °C
Precision:	±1 %
Resolution:	0.1 °C
Power supply:	One 1.5-Volt, "393" size
Dimensions and weight	195 x 20 mm, 24 g

Art. No.	
4058	**Quick digital thermometer**

TEMPERATURE MEASURING SYSTEMS CHAPTER 14

DIGITAL THERMOMETER

Miniflash

Infrared thermometer

Non-contact infrared thermometer with min/max save function. Switchable between °C and °F. With automatic hold and lock functions enabling long-term operations. Perfect for measuring foliage and leaf surface temperatures.

TECHNICAL SPECIFICATIONS:

Measurement range:	–33 to +220 °C
Resolution:	0.1 °C
Precision:	±1.5 °C (0 to +50 °C otherwise 2 %)
Emissions ratio:	0.95, static
Optical resolution:	1,3 : 1
Power supply:	CR2032 button cell
Dimensions and weight:	68 x 37 x 18 mm, 25 g

Art. No.	
4286	**Miniflash**

DIGITAL THERMOMETER

Laser thermometer

Laser infrared thermometer

Non-contact infrared thermometer with laser sight, large backlit LCD and quick response time.

TECHNICAL SPECIFICATIONS:

Measurement range:	Infrared: –33 to +500 °C External thermocouple (NiCr-Ni): –64 to +1400 °C
Resolution:	0.1 °C (1 °C from +200 °C)
Precision:	Infrared: ±2 °C or ±2 % * Thermocouple: ±1 °C or ±1 % * (* the larger of the two values is valid)
Emissions ratio:	adjustable 0.10 to 1.00
Optical resolution:	11 : 1
Power supply:	Two 1.5-V AAA batteries
Run time:	approx. 140 hours
Dimensions and weight:	39 x 175 x 80 mm, 180 g

Art. No.	
4285	**Laser thermometer**

DIGITAL THERMOMETER

Wireless thermometer

Wireless thermometer with up to three transmitters and wireless clock

Wireless thermometer with max. three temperature sensors. Saves min/max temperature. Temperature alarm function for each channel. Range of approx. 30 m. External sensor is protected against splashed water.

TECHNICAL SPECIFICATIONS:

Measurement range:	Indoor temperature: –5 to +50 °C Outdoor temperature: –30 to +60 °C
Resolution:	0.1 °C
Power supply:	Indoor temp.: two 1.5-V AAA batteries Outdoor temp.: one 1.5-V AA battery
Dimensions and weight:	Indoor temp.: 118 x 93 x 52 mm, 179 g Outdoor temp.: 96 x 50 x 22 mm, 62 g

Art. No.	
4250	**Wireless thermometer, one transmitter**
4255	**Individual wireless transmitter for temperature**

DIGITAL THERMOMETER WITH EXTERNAL SENSORS

Temperature probes

NEW

Temperature probes with NiCr-Ni component

The stainless steel temperature probe with NiCr-Ni component is available for a variety of applications in a range of lengths. The 4009, 4020 and 4030 models of the probes are perfect for composting applications. Customer-specific versions are also available (for example, with a second temperature sensor for simultaneous probe measurements at 1 metre and 2 metre depths). Smaller probes are available for laboratory applications, cultivation systems or surface measurements.

TECHNICAL SPECIFICATIONS:

	4009, 4020, 4030
Measurement range:	-20 to +105 °C
Thermocouple:	Type K, class 1
Connection length:	45 cm, or approx. 1.7 m stretched

Art. No.	
4009	Temperature probe ø 12 mm, 1000 mm
4020	Temperature probe ø 12 mm, 1500 mm
4030	Temperature probe ø 12 mm, approx. 2000 mm
4032	Extra charge for additional temperature sensors
4053	Temperature cable probe ø 1 mm, welded with approx. 1m cable
4052	Temperature probe ø 3 mm, 80 mm
4008	Temperature probe ø 3 mm, 120 mm

TEMPERATURE MEASURING SYSTEMS CHAPTER 14

DIGITAL THERMOMETER WITH EXTERNAL SENSORS

Digital thermometer

Digital thermometer for two sensors

Digital thermometer with LCD display suitable for two external temperature probes. This quick and affordable instrument for displaying measurements is suitable for many applications.

TECHNICAL SPECIFICATIONS:

Measurement range:	–40 to +1200 °C
Resolution:	1 °C
Precision:	±1 % +1 °C (0 to +750 °C)
Display:	LCD display
Power supply:	One nine-volt battery, size 6LR61
Dimensions and weight:	108 x 73 x 23 mm, 140 g

Art. No.	
4018	Digital thermometer for two sensors

Digital thermometer

Digital thermometer for precise measurements

This simple, precise thermometer is particularly sturdy and easy to use. It features a min/max function, a hold function, an RS232 port, and a 16-measurement memory. You can also use the single-point calibration feature to adjust the measurement values.

TECHNICAL SPECIFICATIONS:

Measurement range:	–99.9 to +1370 °C
Resolution:	0.1 °C (to 399.9 °C), otherwise 1 °C
Precision:	±0.5 °C
Display:	LCD display
Power supply:	Two 1.5-Volt, AA size batteries
Run time:	approx. 200 hours
Dimensions and weight:	130 x 65 x 25 mm, 240 g

Art. No.	
4023	Digital thermometer for precise measurements
	ACCESSORIES
4075	Software

Digital thermometer

Digital thermometer with wireless option

Quick temperature probes can be connected to this single-channel thermometer. Wireless (cable-free) transmission of measurement allows you to display an additional temperature probe on the unit. An acoustic alarm is triggered when limit values are exceeded. The current measurements and the min/max values can be printed on site with the log printer.

TECHNICAL SPECIFICATIONS:

Measurement range:	–50 °C to +1000 °C
Resolution:	0.1 °C (to 199.9 °C), otherwise 1 °C
Precision:	±(0.5 °C +0.3 %)
Display:	two-character LCD display
Power supply:	One 9-V 6F22 size battery
Run time:	approx. 200 hours
Dimensions and weight:	182 x 64 x 40 mm, 171 g

Art. No.	
4021	Digital thermometer with wireless option
	ACCESSORIES
4034	TOP-SAFE protects against dirt and impact
	Wireless probe, log printer available on request

Data logger

4330

4310

4311

Art. No.	
4330-N	175-T1 data logger
4310-N	175-T3 data logger
4311-N	176-T4 data logger

	ACCESSORIES
4343	Spare battery for the 175-T1 (4330), -T2 (4309), 177 (4311) and 176 (4311-N)
4345	Spare battery for the 175-H2 (4320), -T3 (4310)
4348	1 x 1,5 Volt, type AAA for 175-H1 (4320-N), 175-T1 (4330-N) and 175-T3 (4310-N), order three pieces
4323	Software at USB-Stick

Compact data logger

Data logger for temperature (T1, T3 and T4) and humidity (H1, see.: humidity analysis page 27) for reliable measurement, storage and data documentation functionality. The 175/176 series of compact data loggers are suitable for measuring temperature and relative humidity. They are capable of storing up to 2 mio. measured values.

In addition to the current values, the one-row display shows the min/max values and the specified limit values. Measurement data is not lost when the battery is empty or being replaced. Thus data loss is practically impossible. The data loggers have a USB and a SD card interface, making readout of the data fast and easy. The considerably higher memory capacity and the power supply using conventional batteries are further plus points of the new generation. It goes without saying that the proven one-button menue structure, wich offers absolute operating convenience, has been retained in the new version of the data loggers. These data loggers are suitable for simple and affordable temperature monitoring applications. They are ideal for use in greenhouses, refrigerator transport, refrigerated storage, in display cabinet, or for room monitoring.

The model 175-T3 (4311) – for monitoring compost temperatures – has been recommended by the German Community Composting Organization because it encourages hygienic compost techniques. Required accessory: temperature probe with length of 8, 12, 100, 150 or 200 cm (catalogue page 33, art. no. 4052, 4008, 4009, 4020, 4030). Different models are available depending on the type and number of measurement locations. Application software (for Windows 95, 98, 2000, NT, ME and XP) is optionally available for exporting, displaying (with table and charts), printing and programming data.

TECHNICAL SPECIFICATIONS:

Affordable single-channel temperature logger with internal sensor: Model 175-T1	
Measurement range:	–35 to +55 °C
Resolution:	0.1 °C
Precision:	±0.5 °C from –20 to +55 °C
Data storage capacity:	1 mio. values
Measuring interval range:	adjustable 10 s to 24 h
Operating temperature:	–35 °C to +55 °C
Power supply:	3x AlMn Typ AAA
Run time:	approx. 3.0 years with a 15-min. measuring interval
Protection class:	IP65
Dimensions:	89 x 53 x 27 mm

Dual-channel temperature logger with 2 external probes (NiCr-Ni): Model 175-T3	
Measurement range:	–50 to +1000 °C
Resolution:	0.1 °C
Precision:	±0.5 °C (–50 to +70 °C) ±0.7 % (70.1 to + 1000°C)
Data storage capacity:	1 mio. values
Measuring interval range:	adjustable 10 s to 24 h
Operating temperature:	–35 °C to +55 °C
Power supply:	3x AlMn Typ AAA
Run time:	approx. 3.0 years with a 15-min. measuring interval
Protection class:	IP65
Dimensions:	89 x 53 x 27 mm

Four-channel temperature logger with 4 external probes (NiCr-Ni): Model 177-T4	
Measurement range:	–195 to +1000 °C
Resolution:	0.1 °C
Precision:	±0.5 % (+70.1 to +1000 °C)
±1 digit	±1 % (–200 to –100.1 °C) ±0.3 °C (–100 to +70 °C)
Measurement storage:	2 mio. values
Measurement intervals:	1 s to 24 h
Operating temperature:	–20 to +70 °C
Power supply:	One 3.6-V AA battery
Run time:	8 years with 15-min measurement interval
Protection class:	IP54
Dimensions:	103 x 63 x 33 mm

DATA LOGGER

Data logger accessories

Software for the data logger

Windows software for the data logger: for data analysis and PC-based device reprogramming with new graphic user interface. Convenient export functions, e. g. for further processing of the data in Microsoft Excel, or the generation of a PDF. The software will be delivered on a USB-stick.

Art. No.	
4323	**Software at USB-stick**

TEMPERATURE MEASURING SYSTEMS CHAPTER 14

DATA LOGGER

Mini data logger

Mini temperature data logger

The T174 mini temperature data logger is perfect for taking with you on the road. Simply place the logger with your goods or material (for example, in an airplane, container or refrigerator room) and it will continually and inconspicuously monitor for temperature deviations. It features a high level of data integrity (even with empty battery) and a large display for the current temperature. Easy readout of the data and transport to the PC via USB interface.

TECHNICAL SPECIFICATIONS:

Measurement range:	–30 to +70 °C
Resolution:	0.1 °C
Precision:	±0.5 °C (–30 bis +70 °C)
Measurement storage:	16.000 values
Measurement intervals:	adjustable from 1 min to 24 hours
Operating temperature:	–30 to +70 °C
Power supply:	2 x 3-volt button cell, size CR2032
Run time:	500 days (typical)
Protection class:	IP65
Dimensions:	60 x 38 x 18,5 mm

Art. No.	
4335-N	**T174 mini data logger with wall mount**
4333	**Spare battery CR2032 size**
4323	**Software at USB-stick**

MAGNIFIERS

Thread-counting magnifiers

TECHNICAL SPECIFICATIONS:

Magnification:	12-x / 8-x / 9-x / 6-x
Aperture:	10 x 10 mm / 20 x 20 mm / 10 x 10 mm / 25 x 25 mm
Housing:	aluminium
Height:	23 mm / 39 mm / 30 mm
Scale:	1 mm (4421)

Art. No.	
4410	Thread-counting foldable magnifier, 12-x
4411	Thread-counting foldable magnifier, 8-x
4421	Thread-counting foldable magnifier with scale, 9-x
4419	Thread-counting magnifier with needle gauge

MAGNIFIERS

Illuminated magnifier

TECHNICAL SPECIFICATIONS:

Magnification:	10-x
Lens:	With anti-static coating
Diameter (ø):	30 mm
Housing:	Plastic
Battery:	Three 1.5-V AAA battery

Art. No.	
4420	Illuminated magnifier with pouch

MICROSCOPES

Baton microscope

TECHNICAL SPECIFICATIONS:

Magnification:	40-x
Lens:	Coated high-precision lens
Battery:	Two 1.5-V AA battery

Art. No.	
4430	Baton microscope with illumination

MAGNIFIERS AND MICROSCOPES CHAPTER 15

MAGNIFIERS

High-precision folding magnifier

TECHNICAL SPECIFICATIONS:

Magnification:	6-x / 10-x / 15-x
Diameter ø:	22.8 mm
Lens:	Aplanatic silicate glass lenses
Housing:	Stainless steel
Frame:	Black plastic

Art. No.	
4412	High-precision folding magnifier 6-x
4413	High-precision folding magnifier 10-x
4414	High-precision folding magnifier 15-x
4415	Black leather pouch

MAGNIFIERS

Illuminated magnifier

TECHNICAL SPECIFICATIONS:

Magnification:	15-x
Diameter ø:	18 mm
Lens:	Achromatic silicate glass lenses
Battery:	Two 1.5-V AA batteries

Art. No.	
4416	Illuminated magnifier with plastic pouch

MAGNIFIERS

Pocket microscope

TECHNICAL SPECIFICATIONS:

Magnification:	Adjustable, 40-x / 50-x / 60-x
Lens:	Fine-focus, achromatic lens system
Length:	150 mm
Battery for lighting unit: (accessory)	Two 1.5-V AAA batteries

Art. No.	
4417	Pocket microscope with plastic pouch
4418	Lighting unit with stand

Penetrometer

Determining the soil density

The penetrometer is used to precisely determine the soil density. The stainless steel probe is scaled to mark the soil depth. The display features an easy-to-read colour scale.
Plants living in dense soils can only absorb a limited amount of water and nutrients. Densely compacted soil also restricts the air exchange in the soil and reduces the N-mineralization.
This simple and sturdy hand penetrometer can measure the penetration resistance in soil. It is held vertically and then pressed into the soil with an even pressure on both hand grips. The easy-to-read colour display then shows the pounds per square inch analogue reading. The penetrometer is used in agriculture or sport/golf maintenance applications for detecting compacted layers of soil. This allows you to perform generalized pedological tests and basic foundation surveys (for determining the carrying capacity). You can also examine the expected growth conditions for plants and trees.

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 500 PSI (0 to 3500 kPa or kN/m²)
Divisions:	3, 6, 9, 12, 15 and 18 inch (x 2.54 cm)
Penetration depth:max.	max. 710 mm

Art. No.	
5090	**Penetrometer**

SOIL DENSITY CHAPTER 16

SOIL MEASUREMENTS

Soil probe

Detecting compacted soil layer and compacted areas left by ploughs

The stainless steel soil probe is a tool used for detecting (or probing) soil layer densities, water permeability levels, and soil types. It does not require the soil to be dug up. It can be used to detect zones within the topsoil layer which may disturb root growth (too loose or too dense soil) or to find compression zone caused by ploughs or tractors. It is also useful for detecting differences in soil types in the soil zone (for example, loess on clay or peat on sand).

In addition, the soil probe can be used for tree care applications.

TECHNICAL SPECIFICATIONS:

Measurement range:	1000 mm
Marking scale:	every 100 mm
Dimensions and weight:	ø 8 x 1150 mm, approx. 450 g

Art. No.	
5030	**Soil probe**

SOIL SAMPLING AUGER MADE FROM RUST-FREE STAINLESS STEEL

Sampling auger for pots

Sampling auger suitable for pots, container plants, smaller plant vessels and floriculture.

TECHNICAL SPECIFICATIONS:

Total length, tube length:	350, 200 mm
Outer tube, inner tube ø:	16, 10 mm
Ball handle ø:	30 mm
Weight:	0.185 kg

Art. No.	
5000	Sampling auger for pots

Hand-held sampling auger

Hand-held auger with closed tube tip suitable for potted or containerized plants, floriculture, tree nurseries, and heavily root-bound plants.

TECHNICAL SPECIFICATIONS:

Total length, tube length:	350, 210 mm
Outer tube, inner tube ø:	20, 17 mm
Ball handle ø:	50 mm
Weight:	0.32 kg

Art. No.	
5002	Hand-held sampling auger

Sampling auger

For all-purpose use with solid-built slim grip. Designed for the nitrate kit. Suitable for intensive-use glass-covered crops in natural soils and outdoor vegetables.

TECHNICAL SPECIFICATIONS:

Total length, tube length:	460, 300 mm
Outer tube, inner tube ø:	20, 14 mm

Art. No.	
5004	Sampling auger

SOIL SAMPLING AUGER CHAPTER 17

SOIL SAMPLING AUGER MADE FROM RUST-FREE STAINLESS STEEL

Sampling auger

All-purpose sampling auger with solid-built wide grip. Suitable for glass-covered crops in natural soils and outdoor areas.

TECHNICAL SPECIFICATIONS:

Total length, tube length:	560, 300 mm
Outer tube, inner tube ø:	17, 11 mm
Weight:	0.55 kg

Art. No.	
5003	Sampling auger, solid build

Sampling auger with foot rest

Auger with foot rest for outdoor crops with dense root zones. Solid-built handle and foot rest.

TECHNICAL SPECIFICATIONS:

Total length, tube length:	810, 300 mm
Outer tube, inner tube ø:	20, 14 mm
Weight:	1.5 kg

Art. No.	
5006	Solid-built sampling auger with foot rest
5005	Tube-construction sampling auger with foot rest

Sampling auger with foot rest

Auger with foot rest and extra-short tube – custom designed for grass and golfing applications. Solid-built grip and foot rest.

TECHNICAL SPECIFICATIONS:

Total length, tube length:	810, 100 mm
Outer tube, inner tube ø:	20, 14 mm
Weight:	1.5 kg

Art. No.	
5007	Sampling auger with foot rest

SOIL SAMPLING AUGER MADE FROM RUST-FREE STAINLESS STEEL

Standard type 60

Standard sampling auger for light soils.
With solid grip and 300-mm divisions.

TECHNICAL SPECIFICATIONS:

Total length, tube length:	810, 600 mm
Outer tube, inner tubeø:	22, 15 mm
Weight:	1.25 kg

Art. No.	
5010	Standard type 60

Stripper for dislodging soil probes

Suitable for all sampling augers
except for the sampling auger for pots (art. no. 5000)

Art. No.	
5099	Stripper for dislodging soil probes

Puller for the Pürckhauer

Puller mechanism that latches onto the Pürckhauer. The Pürckhauer is then pulled out of the earth with a pumping motion.

TECHNICAL SPECIFICATIONS:

Stroke height:	750 mm
Stroke load:	350 kg
Weight:	2.3 kg

Art. No.	
5600	Puller for the Pürckhauer

SOIL SAMPLING AUGER CHAPTER 17

SOIL SAMPLING AUGER MADE FROM RUST-FREE STAINLESS STEEL

Type-60 Pürckhauer

Attachable auger grip with rubber sheathing and notch for removing soil samples. Features a slim design and light weight, with 10-cm divisions. Use for outdoor vegetables.

TECHNICAL SPECIFICATIONS:

Total length, tube length:	1000, 600 mm
Outer tube, inner tube ø:	25, 20 mm
Reinforced strike head, ø:	38 mm
Weight:	2.9 kg

Art. No.	
5011	Type-60 Pürckhauer

Type-60 Pürckhauer

Attachable auger grip with rubber sheathing and notch for removing soil samples. Features a short design and light weight, with 10-cm divisions. Use for outdoor vegetables.

TECHNICAL SPECIFICATIONS:

Total length, tube length:	810, 600 mm
Outer tube, inner tube ø:	20, 13 mm
Strike head ø:	34 mm
Weight:	2.4 kg

Art. No.	
5012	Type-60 Pürckhauer
5112	Spare auger grip for the 5012

Type-90 Pürckhauer

Attachable auger grip with rubber sheathing and notch for removing soil samples. Mid-sized design, with 10-cm divisions, for all-purpose use.

TECHNICAL SPECIFICATIONS:

Total length, tube length:	1050, 900 mm
Outer tube, inner tube ø:	25, 17 mm
Reinforced strike head ø:	38 mm
Weight:	3.5 kg

Art. No.	
5014	Type-90 Pürckhauer

SOIL SAMPLING AUGER MADE FROM RUST-FREE STAINLESS STEEL

Type-100 Pürckhauer

Attachable auger grip with rubber sheathing and notch for removing soil samples. Total-cylinder design for pebbly soils, with conical tip. Extra strong auger for garden work. With 10-cm divisions.

TECHNICAL SPECIFICATIONS:

Total length, tube length:	1175, 1000 mm
Outer tube, inner tube ø:	28, 18 mm
Reinforced strike head ø:	38 mm
Weight:	4.0 kg

Art. No.	
5016	**Type-100 Pürckhauer**

Type-100 Pürckhauer

Attachable auger grip with rubber sheathing and notch for removing soil samples. Total-cylinder design made from steel tube for light, sandy soils. With 10-cm divisions.

TECHNICAL SPECIFICATIONS:

Total length, tube length:	1170, 1000 mm
Outer tube, inner tube ø:	30, 24 mm
Reinforced strike head ø:	38 mm
Weight:	3.5 kg

Art. No.	
5017	**Type-100 Pürckhauer**

Type-100 Pürckhauer

Attachable auger grip with rubber sheathing and notch for removing soil samples. Solid-built with 60-cm tapered cone shape. For heavy, compacted soils containing clay. Extra strong construction. With 10-cm divisions.

TECHNICAL SPECIFICATIONS:

Total length, tube length:	1175, 1000 mm
Outer ø:	top: 28 mm, bottom: 25 mm
Inner tube ø:	18 mm
Reinforced strike head ø:	38 mm
Weight:	3.8 kg

Art. No.	
5018	**Type-100 Pürckhauer**

SLEDGE HAMMERS

Simple sledge hammer

Type-I Simplex sledge hammer:

Hammer length:	1050 mm
Weight:	7 kg
Striking surface ø:	125 mm
Head length:	215 mm

Type-II Simplex sledge hammer

Hammer length:	1000 mm
Weight:	5 kg
Striking surface ø:	100 mm
Head length:	200 mm

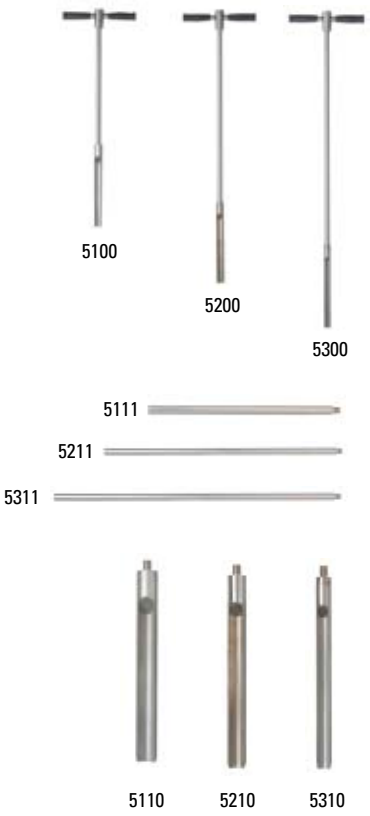
Type-III Simplex sledge hammer

Hammer length:	800 mm
Weight:	3 kg
Striking surface ø:	80 mm
Head length:	105 mm

Art. No.	
5021	**Type-I Simplex sledge hammer**
5022	**Type-II Simplex sledge hammer**
5023	**Type-III Simplex sledge hammer**
	ACCESSORIES
5024	Plastic insert pairs for the 5021
5025	Plastic insert pairs for the 5022
5026	Plastic insert pairs for the 5023
5027	Hickory handle for the 5021: 900 mm
5028	Hickory handle for the 5022: 900 mm
5029	Hickory handle for the 5023: 700 mm
5050	Special tool
5051	Cast handle for the 5021
5052	Cast handle for the 5022
5053	Cast handle for the 5023

SOIL SAMPLING AUGER MADE FROM RUST-FREE STAINLESS STEEL

Multi-piece boring kits



Multi-piece boring kits / boring apparatus consists of shovel, rods, strike head and borer grip. For depths 0 to 30 / 30 to 60 / 60 to 90 cm.

Rubber sheathing and notch for removing samples can be attached to the borer grip. All individual parts are interchangeable.

Art. No.	
5100	**One-piece boring kit** With one grip for 0 to 30 cm boring depth. Weight: approx. 4.0 kg
5200	**Two-piece boring kit** With one grip for 0 to 30 / 30 to 60 cm boring depth. Weight: approx. 6.7 kg
5300	**Three-piece boring kit** With one grip for 0 to 30 / 30 to 60 / 60 to 90 cm boring depth. Weight: approx. 10.0 kg
	ACCESSORIES
5110	Shovel for 0 to 30 cm Inner ø 30 mm, outer ø 38 mm
5210	Shovel for 30 to 60 cm Inner ø 25 mm, outer ø 33 mm
5310	Shovel for 60 to 90 cm Inner ø 20 mm, outer ø 28 mm
5111	Rods for 0 to 30 cm ø 22 mm, length: 50 cm
5211	Rods for 30 to 60 cm ø 22 mm, length: 75 cm
5311	Rods for 60 to 90 cm ø 22 mm, length: 90 cm
5114	Strike head for all rods
5115	Borer grip for strike head ø 38 mm

SOIL SAMPLING AUGER CHAPTER 17

SOIL SAMPLING AUGER MADE FROM RUST-FREE STAINLESS STEEL

Two-part boring kit

Two-part boring kit for taking samples up to approx. 2 m. Includes Pürckhauer auger, extension, and borer grip with rubber sheathing and notch for removing soil samples.

Art. No.	
5500	**Two-part boring kit up to approx. 2 metres.** approx. 6.7 kg
5501	**Pürckhauer with screw-on strike head** Total length: approx 1165 mm, ø 22 mm
	ACCESSORIES
5311	Rods for 60 to 90 cm ø 22 mm, length: 90 cm
5115	Borer grip for strike head ø 38 mm

Spoon auger – stainless steel

Multi-part, extendable stainless steel spoon auger with a custom-shaped spoon tip. It is used for taking samples from rough materials such as compost, bark mulch or wood particles.

TECHNICAL SPECIFICATIONS:

Base unit:	Total length: 900 mm
	Boring penetration length: 300 mm
	outer ø Borer section: 88 mm
	inner ø Borer section: 8 mm
	Spoon slot in the insertion area: 70 mm
Extension:	Length: 650 mm
	Outer rod: 22 mm
	Inner rod: 16 mm

Art. No.	
5040	**Base unit**
5041	**Extension**

Stainless steel cross-section spade

Multi-part cross-section spade: used to examine grass sections on a golf course or sport field.

TECHNICAL SPECIFICATIONS:

Weight:	approx. 2.6 kg
	Rods + 2 spade halves
Length:	750 mm, spade 200 mm

Art. No.	
5900	**Stainless steel cross-section spade**

MOBILE NUTRIENT ANALYSIS

STELZNER® soil kit

Mobile nutrient analysis in the field

The STELZNER® soil kit includes all instruments and accessories required for producing the soil extracts and the subsequent determination of phosphate (P), soil structure, potassium (K), pH, ammonium, nitrite and nitrate (N). The soil extracts are produced either with a calcium-acetate-lactate (CAL) solution (for determining P and K) or with a $CaCl_2$ solution (for determining N and pH).

If your national soil-analysis regulations or local geological conditions require, the STELZNER® soil kit can also be equipped with extraction solutions other than $CaCl_2$ or CAL.

The detailed instructions make it easy to carry out on-site analysis of the nutrients. Depending on your requirements, there are different reagents, indicators and instruments available to determine your key nutrients. The AMOLA® (refer to page 43) allows you to precisely analyse weak concentrations and a variety of other materials. Reagents and indicators are very useful for making speedy determinations directly in the field. The NITRAT 2000 (refer to page 16) and the Nitrachek (refer to page 17) are excellent choices for measuring nitrate.

Content STELZNER® soil kit
Case, sampling auger, 2-mm strainer with drip pan, precision scale, spray bottle with deionised water, 2 funnels, 100 folded filters, 4 extraction bottles, 100-ml beaker, 2 250-ml beakers and 2 400-ml beakers, 6 volume-measuring beaker with covers, 500-ml screw-top can, plastic syringes, glass stirring rods, 4 0.5-l extraction bottles, 2 plastic shovels, metal scoop, cuvette cell stand with 16 empty 1-l reagents, $CaCl_2$ extraction concentrate and CAL

Art. No.	
1875	**STELZNER® soil kit**
	ACCESSORIES
1876	$CaCl_2$ extraction concentrate, 1 l bottle, for producing the extraction solution
1877	CAL extraction concentrate, 1 l bottle, for producing the extraction solution
2033	Folder filters for the analysis process, 100 pcs., ø 240 mm
2026	Cuvette cell stand
0810	Strainer, 33 x 19 cm, 2/4/10 mm with drip pan
2031	Powder funnel, ø 120 mm
2043	Powder funnel, ø 80 mm
2042	Liquid funnel, ø 80 mm
2030	Wide-neck extraction bottle, 1.0 l, with top
2029	Wide-neck extraction bottle, 0.5 l, with top
0570	100-ml graduated cylinder Clear PE glass with elongated shape
2044	250-ml beaker with graduation marks
2045	Graduated cylinder, 400 ml with grading scale
2046	Screw-top can, 500 ml
2048	Glass stirrer, ø 10 mm, approx. 15cm
2049	Plastic shovel, 25 ml
2051	Metal scoop, flat surface and spoon

NUTRIENT ANALYSIS CHAPTER 18

MOBILE NUTRIENT ANALYSIS

Reagents and indicators

Reagents and indicators for performing nutrient analysis in the field

As a supplement to the soil kit, a variety of VISOCOLOR® reagents or indicators (see page 19) can be used to carry out simple soil analysis in the field. Contact us for more information concerning these additional possibilities for analysis. There are a variety of methods available to suit your individual requirements and required level of precision.

Art. No.	
1879	VISOCOLOR® reagents kit HE phosphorus in soil
1881	Phosphorus colour screen
1882	Pyrophosphate solution
1883	VISOCOLOR® ECO potassium reagents kit
2076	Potassium* 200 to 1500 mg/l, 100 tests
1886	VISOCOLOR® reagents kit HE ammonium in soil 0.5 to 15 mg/l
2071	Ammonium* 10 to 400 mg/l, 100 tests
2069	Nitrate 10 to 500 mg/l /Nitrite 1 to 80 mg/l, 100 tests
2005	Nitrate 10 to 500 mg/l, 100 tests
2084	pH test 2 – 9, 100 tests
	* Test strips with reagents
	Refer to page 19 for more indicators

AMOLA® AGRAR MOBILE LAB with accessories

Photometric nutrient analysis

The affordable AMOLA® AGRAG mobile lab enables you to perform quick, precise and straight-forward analysis on water and soil samples. It is used by consultants and experts for many applications, including at horticulture production facilities, soil production sites, tree nurseries, public green spaces, agriculture crops, sales promotions in garden centres, and for composting facilities. Nowadays, mobility and flexibility are more important than ever.

The AMOLA® features a compact design, high-precision accuracy, and convenient handling – this is a combination which ensures plant growth and commercial success.

The operations manual included with the mobile lab contains instructions for measuring in all cuvette/cell tests, with associated pictograms and analysis strategies for a range of crops. The soil kit is useful for preparing the samples before the soil analysis. We recommend attaching the dispenser to a bottle during the pipetting of the extraction concentrates.

The STELZNER® soil kit is quite useful when you need to prepare soil samples professionally (refer to page 42).

TECHNICAL SPECIFICATIONS:

Technology:	Beam photometer, 380 to 720 nm
Lenses:	Manual filter wheel with 6 coloured glass filters (380/405/470/520/605/720 nm)
Wave length precision:	±10 nm
Display:	two-character LCD display
Precision:	±3 %
Communication:	RS232
Power supply:	Rechargeable battery with power supply unit
Run time:	approx. 1000 measurements
Dimensions and weight:	Case: 55 x 40 x 17 cm, approx. 6.8 kg

Art. No.	
1800	**AMOLA® AGRAR MOBILE LAB with operations manual** Base unit with 4 rechargeable batteries and charger, Cylinder-stroke pipette with pipette tips, 2 pipette stands for 16 pipettes, 1 reagent stand with 16 sample bottles, 3 clocks for timing reactions during analyses, 1 analysis start set for every 20 nitrate-nitrogen samples, phosphorus, potassium, magnesium. Stable plastic case with insert
1801	**AMOLA® AGRAR MOBILE LAB** Base unit with 4 rechargeable batteries and charger
	ACCESSORIES
1810	Nitrate NO_3-N, 0.3 to 22 mg/l 20 pcs. / package
1812	Ammonium NH_4-N, 1 to 40 mg/l 20 pcs. / package
1813	Phosphate P_2O_5, 10 to 50 mg/l 19 pcs. / package
1814	Potassium K, 2 to 50 mg/l 20 pcs. / package
1815	Magnesium Mg, 5 to 50 mg/l Calcium Ca, 10 to 100 mg/l 20 pcs. / package
1817	Iron Fe 0.1 to 3.0 mg/l 20 pcs. / package
1818	Copper Cu 0.1 to 7.0 mg/ 20 pcs. / package
1819	Zinc Zn, 0.1 to 4.0 mg 20 pcs. / package
1820	Molybdenum Mo 1.0 to 40 mg/l 20 pcs. / package
1821	Manganese Mn 0.1 to 10 mg/l 20 pcs. / package
1822	Chloride Cl 0.5 to 50 mg/l 20 pcs. / package
1823	Sulphate SO_4 10 to 200 mg/l 20 pcs. / package
2020	Timer
1802	Operations manual
1860	Cylinder-stroke pipette, 1.0 ml
1804	Blue plastic tips for cylinder-stroke pipette no. 1860, 1803; 100 pcs.

LAB CONFIGURATION

NANOCOLOR® 500 D

Photometric nutrient analysis

The NANOCOLOR® 500 D digital photometer represents the next innovative step in our photometric product line. This instrument can be used for any water or waste water analysis task and is perfectly suited to meet the present and future requirements of our customers. The NANOCOLOR can be used in industrial or municipal waste water management, drinking water supply, ground water, surface water, coolant water and boiler water systems, and soil analysis. The state-of-the-art illuminated graphical display is menu driven and capable of clearly displaying all key information (including date/time, sample number, etc.). The display also shows when measurements do not lie within the specified measurement ranges. Measurements that exceed the measurement range can be queried in order to evaluate the dilution used.

The auto-save function can be turned on and off in the configuration menu. Up to 3000 on-site measurements can be made using the heavy-duty integrated high-power battery with charge controller. The unit can also be continuously operated under 220/110 VAC. A battery-status icon is shown on the display. The photometer has a power-saver mode where it can be set to shut-off automatically when not used (for either 10, 20 or 120 minutes).

The analysis routine is made simple and easy with the integrated laser scanner which is used for fully-automatic instant cuvette detection.
Round cuvettes (14-mm ID) and rectangular cuvettes (10, 20 and 50 mm) can be used without any adapters.

One of ten languages can be selected in the configuration menu.

TECHNICAL SPECIFICATIONS:

Type:	beam filter photometer with microprocessor controller, auto-test and auto-calibration functions; Wavelength range: 340 to 860 nm
Lenses:	automatic filter wheel with 10 interference filters
Wavelengths:	345 / 365 / 436 / 470 / 520 / 540 / 585 / 620 / 690 / 800 nm plus 2 compartments for extra filters
Precision:	±2 nm, half-width 10 to 12 nm
Light source:	Wolfram-type point source lamp
Detector:	silicium photocell
Zero compensation:	automatic
Measuring modes:	over 100 pre-programmed tests, 99 user-programmable methods extinction, transmission, factor, kinetic, 2-point calibration
Measuring range:	approx. 3 E, unsigned
Accuracy	±1 %
Long-term stability:	<0.002 E/h
Cuvette compatibility:	round cuvettes, 14 mm ID, rectangular cuvettes, 10, 20, 50 mm
Data memory:	500 measurement records, GLP-compliant
Display:	graphical back-lit display, 64 x 128 point, 10 languages
Operation:	barcode system, menu-driven display, membrane keyboard
Ports:	USB 1.1 and bi-directional serial RS 232
Update:	via Internet / PC
Operating range:	0 to +50 °C, to 90 % rel. humidity
Power supply:	100 to 240 VAC, 50/60 Hz / 6 VDC, 3.2 Ah via built-in rechargeable battery with charge controller and power supply unit
Dimensions and weight:	227 x 282 x 105 mm, 2.4 kg

Art. No.	
1850	**NANOCOLOR® 500 D all-purpose photometer** Including software CD, operations manual, dust cover, power supply unit, data cable, USB cable and calibration cuvette cell in a sturdy travel case.
	ACCESSORIES
1810	Nitrate NO_3-N, 0.3 to 22 mg/l 20 pcs. / package
1812	Ammonium NH_4-N, 1 to 40 mg/l 20 pcs. / package
1813	Phosphate P_2O_5, 10 to 50 mg/l 19 pcs. / package
1814	Potassium K, 2 to 50 mg/l 20 pcs. / package
1815	Magnesium Mg, 5 to 50 mg/l Calcium Ca, 10 to 100 mg/l 20 pcs. / package
1817	Iron Fe 0.1 to 3.0 mg/l 20 pcs. / package
1818	Copper Cu 0.1 to 7.0 mg/ 20 pcs. / package
1819	Zinc Zn, 0.1 to 4.0 mg 20 pcs. / package
1820	Molybdenum Mo 1.0 to 40 mg/l 20 pcs. / package
1821	Manganese Mn 0.1 to 10 mg/l 20 pcs. / package
1822	Chloride Cl, 0.5 to 50 mg/l 20 pcs. / package
1823	Sulphate SO_4 10 to 200 mg/l 20 pcs. / package
1851	Stand for 15 round cuvettes and 2 extraction vessels
1803	Digital cylinder-stroke pipette 0.2 to 1.0 ml, adjustable, with tip ejection mechanism
1804	Blue plastic tips for cylinder-stroke pipette no. 1860, 1803; 100 pcs.
1808	Digital cylinder-stroke pipette 1.0 to 5.0 ml, adjustable, with tip ejection mechanism
1809	Transparent plastic tips for cylinder-stroke pipette no. 1808, 1803; 100 pcs.

LAB CONFIGURATION

Thermoblock

Equipment for sample preparation

Programmable thermoblock for dissociative chemical analysis of samples. Easy to operate symbol buttons, pre-programmed standard programs for all routine extractions, and application-specific analysis methods. Also features high level of temperature stability and quick heat-up time. It is possible to analyse 12 round-cuvette samples (with 16 mm outer diameter) simultaneously.

TECHNICAL SPECIFICATIONS:

Display:	2 LED displays with 6-mm character height Temperature and residual display
Operations:	Membrane-covered symbol buttons with entry confirmation
Operating temperature:	+30 to +160 °C (in 1 °C intervals)
Temperatures:	5 pre-programmed temperatures 70 / 100 / 120 / 148 / 160 °C
Heat-up time:	From +20 to +160 °C within ten minutes
Heating intervals:	4 pre-programmed heating intervals Time range: 0:01 h to 99:59 h (in 0:01 h steps)
Safety features:	Interchangeable safety cover for touch protection, Integrated hood, Over-heating protection
Communication:	RS232 connection for NANOCOLOR® T Set (enables fully-automatic calibration and creation of a a testing certificate for test-equipment monitoring in compliance with DWA – A 704) Update with PC
Power supply:	110 to 230 VAC, 50/60 Hz
Power consumption:	125 / 250 VA
Dimensions and weight:	155 x 250 x 140 mm, approx. 1.8 kg

Art. No.	
1855	**Thermoblock with hood and power cable**

	ACCESSORIES
1856	NANOCOLOR® T Set for calibration and temperature control

LAB CONFIGURATION

UM 200 cabinet drier

Equipment for sample preparation

Housing made from burnished stainless steel. Interior made from rust-free acid-proof stainless steel. With natural ventilation and mechanical temperature control. Heats up very quickly. Designed to a high safety standard. Including timer from 0 to 24 hours and two stainless steel push-in plates.

TECHNICAL SPECIFICATIONS:

External dimensions:	550 x 600 x 400 mm
Internal dimensions:	400 x 320 x 250 mm
Volume:	32 litres
Operating temperature:	30 to 220 °C
Voltage:	220 V 1/N
Power:	1100 kW
Weight:	29 kg

Art. No.	
6100	**Cabinet drier UM 200 with fully-isolated stainless steel door**

LAB CONFIGURATION

Labotherm LS muffle furnace

Equipment for sample preparation

Muffle furnace with stainless steel housing and high-quality insulation. Switching system in lower section of furnace featuring a user-friendly, dust-proof membrane keyboard. Separate ON/OFF switch. Precise programming in 1°C or 1 min. intervals. Adjustable increase in heat-up time.

TECHNICAL SPECIFICATIONS:

External dimensions:	400 x 530 x 450 mm
Internal dimensions:	200 x 130 x 180 mm
Max. temperature:	1100 °C
Voltage:	230 V 1/N
Power:	2.4 kW
Weight:	33 kg

Art. No.	
6200	**Muffle furnace including switch/control system with controller**
6201	**Flue with fan**
6202	**Ceramic collecting tray**

LAB CONFIGURATION

Strainer machine

Lab strainer machine and accessories

Strainer machine for the laboratory, for max. 16 analysis strainers, with 50-mm edge height, and up to 215 mm ø. Dry and wet sieving/straining are both possible. Stainless steel strainers in compliance with DIN ISO 3310/1, with 200 mm diameter and 50 mm edge height. Additional sizes are available on request.

Art. No.	
6080	**Lab strainer machine with universal clamping attachment**
	ACCESSORIES
6054	63 µm
6057	200 µm
6060	630 µm
6063	1.00 mm
6064	2.00 mm
6065	4.00 mm
6062	5.00 mm
6066	6.30 mm
6068	10.00 mm
6061	20.00 mm
6069	Strainer cover
6070	Collection base
6071	Intermediate base
6072	Intermediate ring
6073	Base with run-off
6074	Spare seal

NUTRIENT ANALYSIS CHAPTER 18

LAB CONFIGURATION

Dewar vessel

Dewar vessel for determining the rotting degree

Dewar vessel made from silicoborate glass, silver plated, with metal sheathing. Enclosure made from zinc-plated iron sheet. Additional sizes are available on request.

TECHNICAL SPECIFICATIONS:

Temperature:	-196 to +600 °C
Capacity.	max. 1.5 l
Weight:	1.2 kg

Art. No.	
6095	**Dewar vessel**

LAB CONFIGURATION

Water purifier cartridge

Water purifier cartridge for non-pressurized desalinization

Plastic pressure-free desalinization cartridge: filled with regenerative ion-exchange resin material. Includes uptake pipe, Seran filter cloth, 1.5-m intake hose, 0.5-m outlet hose. Desalinized water is immediately available after water supply is connected. Additional sizes are available on request.

TECHNICAL SPECIFICATIONS:

External dimensions, in cm: H x ø:	48 x 16
Flow rate:	50 l/h
Capacity (10 °dGH):	440 l
Weight:	5 kg

Art. No.	
4031	**Desalinization cartridge**
4038	**Connection kit** Connection hoses, uptake pipe, flow-through electrode with EC meter
4042	**Regeneration**

LAB CONFIGURATION

Lab accessories and individual components

Art. No.	
2013	**100-ml beaker** with graduation marks
2044	**250-ml beaker** with graduation marks
2040	**1-litre beaker** with graduation marks
2043	**Powder funnel** ø 80 mm
2042	**Liquid funnel** ø 80 mm
0600	**1000-ml graduated cylinder** Clear PE glass with elongated shape
0580	**1000-ml graduated cylinder** Clear PE glass with elongated shape
0570	**100-ml graduated cylinder** Clear PE glass with elongated shape
0560	**10-ml graduated cylinder** Clear PE glass with elongated shape

LAB CONFIGURATION

Scale

Manual pointer scale

Small easy-to-use scale with adjustable zero positioning.

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 1000 g
Resolution:	5 g
Tray:	132 x 115 x 53 mm, 700 ml
Housing:	Plastic
Dimensions and weight:	200 x 135x 110 mm, 280 g

Art. No.	
4060	**Manual scale**

LAB CONFIGURATION

Scale

Electronic precision scale

Electronic precision scale for pesticides, seeds, etc. Switch: On/off, automatic tare, automatic shut-off / zero position calibration system available.

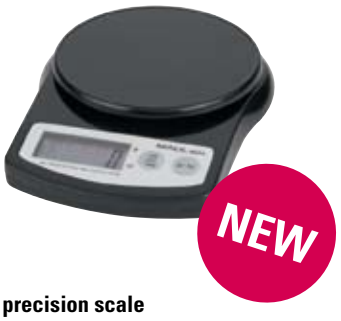
TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 500 g
Resolution:	0.1 g
Min. load:	0.1 g
Tray:	Plate: ø 65 mm
Power supply:	Four 1.5-V AAA batteries
Housing:	Plastic with tray
Dimensions and weight:	115 x 88 x 28 mm, 150 g

Art. No.	
4069	**Electronic precision scale**

LAB CONFIGURATION

Scale



Electronic precision scale

Electronic battery-operated precision scale for lab use.

Switch: On/off, automatic tare, automatic shutoff

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 500 g
Resolution:	0.1 g
Tray:	Plate: ø 120 mm
Power supply:	Two 1.5-V AAA batteries

Art. No.	
4066	**Precision scale**

NUTRIENT ANALYSIS CHAPTER 18

LAB CONFIGURATION

Scale

Electronic SOLAR scale

Solar-powered pesticide scale for the lab, with reserve solar energy function. Utilization: less than 150 lux

Switch: On/off, automatic tare, automatic shutoff / zero position. Min. load: 0.4 g

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 2000 g
Resolution:	0.2 g (0 to 100 g) 1.0 g (100 to 2000 g)
Tray:	Plate: ø 125 mm
Housing:	Plastic
Dimensions and weight:	196 x 125 x 65 mm, 410 g

Art. No.	
4062	**Electronic SOLAR scale**

LAB CONFIGURATION

Scale

Electronic scale

Electronic scale for pesticides
with stainless steel plate. Battery operated.

Switch: On/off, automatic tare, automatic shutoff

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 2000 g
Resolution:	1.0 g
Weighing surface:	170 x 120 mm
Power supply:	One 3-Volt, CR2032 size battery
Dimensions and weight:	220 x 140 x 23 mm, 3 kg

Art. No.	
4067	**Electronic scale**

LAB CONFIGURATION

Scale

Electronic pesticide scale

Electronic precision scale for pesticides, with RS232 port, including adapter and batteries.

Switch: On/off, automatic tare

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 5000 g
Resolution:	1.0 g
Weighing area:	185 x 185 mm
Power supply:	Six 9-Volt batteries, or mains connection
Weight:	3 kg

Art. No.	
4064	**Electronic pesticide scale**
4068	**Power supply unit**

CUSTOM-PRINTED MARKETING ITEMS

Double pocket magnifier

Double pocket plastic magnifier. Magnifies: 4-x or 8-x, Lens diameters: 34 mm with 2 lenses, 4-x/8-x.

Art. No.	
4400	**Double pocket magnifier**

CUSTOM-PRINTED MARKETING ITEMS

Moisture tester

Moisture meter for your plants. The point indicates the soil moisture level. Operates without batteries. The long probe enables measurements deep in soil.

Art. No.	
8005	**Moisture tester**
8006	**Moisture tester** Box with 12 pcs. = unit price
8007	**Moisture tester** 10 boxes = 120 pcs. = unit price

CUSTOM-PRINTED MARKETING ITEMS

Moisture, pH and light tester

Simple test meter for moisture and pH in soil. Also measures the light intensity received by your plants. The pointer indicates the value on the multi-scale. Operates without batteries. The long probe enables measurements deep in soil.

Art. No.	
8002	**Moisture, pH and light tester**
8003	**Moisture, pH and light tester** Box with 12 pcs. = unit price
8004	**Moisture, pH and light tester** 10 boxes = 120 pcs. = unit price

MARKETING GIFTS CHAPTER 19

CUSTOM-PRINTED MARKETING ITEMS

Rain gauge

Plastic rain gauge with rain quantity scale in litres per m². Model with basket, pole fitting or rotary ring for keeping track of monthly rainfall levels.

Art. No.	
4011	**Rain gauge with pole fitting**
4203	**Rain gauge with rotating ring**
4204	**Rain gauge with basket**

CUSTOM-PRINTED MARKETING ITEMS

Thermometer

Min/Max plastic thermometer with easy-to-ready scale. Measurement range: –38 to +50 °C. The metal gardener thermometer comes with an easy-to-read scale in a variety of sizes. Measurement range: –40 to +50 °C.

Art. No.	
4010	**Min/max thermometer** 230 x 79 mm, 120 g
4019	**Gardener thermometer** 205 x 40 mm, 60 g
4059	**Gardener thermometer** 280 x 58 mm, 150 g
4017	**Gardener thermometer** 450 x 80 mm, 130 g

CUSTOM-PRINTED MARKETING ITEMS

Customized marketing gifts with your corporate logo

We can custom print selected products when you order 100 or more.

Silkscreen print	
Slide/transparency price	per colour
Silkscreen price	per colour
Setup costs	per colour
Printing costs	unit / per colour
Circular silkscreen print	
Slide/transparency price	per colour
Silkscreen price	per colour
Setup costs	per one colour
Printing costs	unit / per colour
Pad/dabber printing	
Offset film price	per colour
Printing plate price	per colour
Setup costs	per text or colour
Printing costs	unit / per colour

YOUR CUSTOMER NUMBER D

PRONOVA Analysentechnik GmbH & Co. KG
STELZNER® product range
Bahnhofstraße 30
D-07639 Bad Klosterlausnitz, Germany

Bank account # 777 933 301
Deutsche Bank AG, routing # 100 700 24
IBAN: DE83100700240777933301
BIC/Swift: DEUTDEDBBER

VAT ID number: DE 194 694 256

Your billing address

Company
Name
Street address
Town, postal code
Telephone:
Fax
VAT tax number

Your delivery address
(if different than billing address)

Company
Name
Street address
Town, postal code
Telephone:
Fax

Quantity	Art. No.	Product
		(Soil sample orders found on back side of form)
		Postage and handling *)

*) Within Germany, with max. size 1.20 m x 0.60 m x 0.60 m and max. weight 25 kg, max. 8.00 EUR. Request rates for international delivery or for larger dimensions/weights.

Date Signature

YOUR CUSTOMER NUMBER D

Please indicate which examinations you would like us to conduct for you.

Soil examinations	
☐ Nitrogen N_{min} (ammonium and nitrate)	☐ + Fertilizer recommendation
☐ Total nitrogen	
☐ Basic nutrient examination: pH, K, P, Mg	(including fertilization recommendation)
Topsoil / humus	
☐ One sample	
☐ 2 to 4 samples	
☐ 5 or more samples	
☐ Sulphur S_{min}	☐ + Fertilizer recommendation
☐ Clay content	
Heavy metals	
☐ Heavy metal extraction analysis	
☐ per element (not including mercury or arsenic)	
☐ Mercury or arsenic	
☐ Calcium	
☐ Salt content	
Compost examination	
☐ Small compost analysis – light soluble nutrients: nitrate-N, ammonium-N, P, K, Mg, pH, salt content, dimensional weight, water content, organic matter (loss due to burning/heating)	
☐ Mid-level compost analysis – similar to small compost analysis plus total plant nutrients: Kjeldahl nitrogen, P, K, Mg, Ca	
Heavy metal content	
☐ Lead, cadmium, chrome, copper, nickel, mercury, zinc (incl. extraction analysis)	
Fertilizer examination	
☐ Total content of N, P, K, organic matter, heavy metals and sulphur. Similar to soil examinations.	
Irrigation water examination	
☐ Nitrate	☐ Ammonium
☐ Phosphate	☐ Sulphate
☐ Calcium	☐ Sodium
☐ Magnesium	☐ Potassium
☐ Chloride	☐ Iron
☐ Total hardness:	
Additional tests available on request.	

Normally, we can guarantee a processing time of one week or less upon receipt of your sample.
Slightly more time (but not more than two weeks) may be needed for special examinations (for example, heavy metals).

Date Signature

TEL ++49(0)3 66 01/93 49 06 FAX ++49(0)3 66 01/93 49 07 WWW.STELZNER.DE

Notes

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Legal details

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Visit our online shop www.stelzner.de

NEW

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