AGRAR MEASUREMENT EQUIPMENT

STELZNER®
Soil testing equipment

Development
Production
Consulting
Service

Soil meters
Gas and liquids analysis
Nutrient analysis
Climatic measuring systems
Accessories

PRODUCT CATALOGUE 2016

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SOIL MEASUREMENTS

pH AGRAR 2000

3002

3011, for soil and water

3010, for water

For measuring pH either directly on-site in the soil 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 key 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 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:	Liquid crystal display
Operating temperature:	+5 to +45 °C
Power supply:	One nine-volt battery, size 6LR61
Service life:	approx. 100 hours
Protection degree:	IP40
Dimensions and weight:	125 x 75 x 45 mm, 190 g
Dimensions and weight with case:	370 x 290 x 90 mm, approx. 3.0 kg

ARTICLE 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 deionized water, technical manual
	ACCESSORIES
3011	pH piercing electrode made of glass, with three diaphragms, 3 mole/l KCl, 1 metre attached cable with BNCplug
3033	pH piercing electrode made of glass, with 3 diaphragms, mole/l KCl, without cable
3004	1 metre attached cable with BNC plug for pH piercing electrode made of glass Article No. 3033
3010	pH plastic electrode for liquids only, with gel electrolyte, 1 metre attached cable with BNC plug
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	Buffering tablets* for calibration solutions 5 tablets for pH 4
3027	Buffering tablets* for calibration solutions 5 tablets for pH 7
3016	Buffering 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 with deionized water
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:	four LR44 button-cell batteries
Service life:	approx. 80 hours
Protection degree:	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

ARTICLE NO.	
3100	**pH 205** Base unit with insertion probe, retention cap, belt/wall holder
3102	**pH 205 starter 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 with KCl gel filling
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 EQUIPMENT CHAPTER 1

SOIL MEASUREMENTS

pH Soiltester

Sturdy tester for direct measurements in the field

The pH Soiltester 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

ARTICLE NO.	
3000	**Soiltester pH meter** Soiltester meter, measuring sleeve, sand paper, manual with pH guideline values
	ACCESSORIES
3020	Soil-sample measuring sleeve for the Soiltester pH meter
3023	Sand paper

Hellige pH meter

Manufactured in-house

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.

It is manufactured in accordance with the original design after the product rights were acquired.

ARTICLE NO.	
2999	**Hellige pH meter**
	ACCESSORIES
2998	Indicator solution Refill solution, 100 ml bottle Sufficient for 100 to 120 tests
	Other bundles are available on request.

Indicators

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

TECHNICAL SPECIFICATIONS:

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

ARTICLE NO.	
2083	**Measurement range: 0 to 14 pH** 100 pieces
2084	**Measurement range: 2 to 9 pH** 100 pieces
2085	**Multi-sticks** 100 pieces

LIQUID MEASUREMENTS

pHep4

pH/T Pocket Tester

The pH/T pocket tester pHep4 is designed for taking simple and speedy pH measurements in liquids. It 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 Temperatur: 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
Service life:	approx. 350 hours
Dimensions and weight:	163 x 40 x 26 mm, 85 g
Special features:	water-proof

ARTICLE 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 55

pH/T Pocket Tester

The pH 55 is a small, pocket-sized water-proof 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 has an automatic calibration function (1-point or 2-point) and a replaceable electrode.

TECHNICAL SPECIFICATIONS:

Measurement range:	pH: -2.0 to 16.0 Temperature: -5.0 to +60 °C
Resolution:	pH: 0.1 Temperature: 1 °C
Precision:	pH: ±0.1 Temperature: ±0.5 °C
Display:	two-character LCD display
Operating temperature:	-5.0 to +50 °C
Power supply:	Four 1.5 volt batteries (LR44)
Service life:	approx. 300 hours
Dimensions and weight:	200 x ø 38 mm, 100 g
Special features:	water-proof

ARTICLE NO.	
3007	**pH 55** pH/T pocket tester with buffer solution
	ACCESSORIES
3034	Replacement pH electrode for the pH 55
3005	pH 4.0 buffer solution 20 ml bag
3006	pH 7.0 buffer solution 20 ml bag

pH flow meter

pH measuring transducer

with display and analogue output. Suitable for stationary measurements of the pH value within pipes or open ponds. Automatic or manual temperature compensation.
It can also be connected to the EMS event reporting system (refer to page 47).

TECHNICAL SPECIFICATIONS:

Measurement range:	0.00 to 14.00
Resolution:	0.01
Precision:	± 0.02
Display:	Liquid crystal display
Analogue output:	4 – 20 mA
Power supply:	24 VDC
Protection degree:	IP65, except for the connections for the electrodes and temperature
Mounting:	Wall mount
Dimensions:	82 x 80 x 55 mm

ARTICLE NO.	
3201	**pH flow meter** Base unit without pH electrode
3010	**pH plastic electrode** for liquids only, with gel electrolyte, 1 metre attached cable with BNC plug
3210	**One-inch flow fitting** Tee piece with fitting aid, screw or adhesive connection, PVC material
	Other flow fittings are available on request.

MEASURING ACTIVITY DIRECTLY IN SOIL

PET 2000

1100

Activity measurements and monitoring of 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:	Liquid crystal display
Operating temperature:	+5 to 45 °C
Power supply:	One nine-volt battery, size 6LR61
Service life:	25 hours
Protection degree:	IP40
Dimensions and weight:	125 x 75 x 45 mm, 190 g
Dimensions and weight with case:	370 x 290 x 90 mm approx. 2.7 kg

ARTICLE NO.	
1000	**PET 2000 activity meter**
	Base unit without AM probe
1100	**Soil advisory kit, type X**
	PET 2000 with AM probe (25 cm), 6 nitrate test strips, 100 ml beaker, spray bottle with deionized 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
8102	Nitrate (each bag with 6 test strips)
1004	Spray bottle with deionized water
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.

ARTICLE NO.	
1011	**PE controller with AM probe**
1012	**PE controller with case**
	PE controller with AM probe (25 cm), six nitrate test strips, 100 ml beaker, spray bottle with deionized water
	ACCESSORIES
2005	Nitrate test strips, Box with 100 strips
8102	Nitrate (each bag with 6 test strips)
1004	Spray bottle with deionized water
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 S/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.
Please note: For the basis and nutrient salt solutions with high salt content, we recommend using the glass-platinum conductivity electrode instead of the carbon conductivity electrode. In solutions with high salt concentrations, the glass-platinum conductivity electrode has less polarization and thus provides improved linearity and more accurate readings.

The EC 2000 is a precise measuring instrument with temperature compensation that can be calibrated. It is used for quickly determining the mS/EC values in solutions from 0 – 20 mS/cm (with a carbon conductivity electrode) or 0 – 200 mS/cm (using a glass-platinum conductivity electrode).

TECHNICAL SPECIFICATIONS:

Measurement range:	Conductivity: 0 to 20 mS/cm with carbon conductivity electrode and 0 to 200 mS/cm with glass-platinum conductivity 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:	Liquid crystal display
Operating temperature:	+5 to 45 °C
Power supply:	One nine-volt battery, size 6LR61
Protection degree:	IP40
Dimensions and weight:	125 x 75 x 45 mm, 190 g
Dimensions and weight with case:	370 x 290 x 90 mm, approx. 2.9 kg

ARTICLE 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, spray bottle with deionized water, Beaker, technical manual
4095-P	**EC 2000 Conductivity meter complete with case** EC 2000 with glass-platinum conductivity electrode, calibration solution 1.4 mS/cm, 12.88 mS/cm and 111.8 mS/cm, spray bottle with deionised water, 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
1004	Spray bottle with deionized water
1304	Calibration solution, 111.8 mS/cm 100 ml bottle
3019	One nine-volt battery, size 6LR61

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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 an 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:	four 1.5 volt batteries
Service life:	100 hours
Dimensions and weight:	163 x 40 x 26 mm, 85 g
Special features:	EC/TDS selectable 0.45 to 1.00 Selectable temperature coefficient (ß) 0.0 to 2.4 %/°C waterproof

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

EC 59

EC/TDS pocket tester

The EC/TDS 59 is a small, pocket-sized water-proof 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. It has an automatic calibration function (1,413 µS/cm) and a replaceable electrode.

TECHNICAL SPECIFICATIONS:

Measurement range:	EC:0 to 3,999 µS/cm TDS: 0 to 2,000 ppm Temperature: 0.0 to +60 °C
Resolution:	EC: 1 µS/cm TDS: 1 ppm Temperature: -0.1 °C
Precision:	EC: ±2 % of measuring range TDS: ±2 % of measuring range Temperature: ±0.5 °C
Display:	two-character LCD display
Operating temperature:	-5.0 to +50 °C
Power supply:	Four 1.5 volt batteries (LR44)
Service life:	approx. 100 hours
Dimensions and weight:	200 x ø 38 mm, 100 g
Special features:	water-proof

ARTICLE NO.	
4092	**EC 59**
	EC/TDS pocket tester with calibration solution
	ACCESSORIES
4109	Replacement EC electrode for EC 59
1306	Calibration solution, 1.4 mS/cm 20 ml bag

EC flow meter

Conductivity flow meter

Conductivity measuring transducer with display and analogue output. Suitable for stationary conductivity measurements within pipes or open ponds. Optionally displays the temperature. Fully scalable output signal.
It can also be connected to the EMS event reporting system (refer to page 47).

TECHNICAL SPECIFICATIONS:

Measurement range:	0.0 to 200.0 µS/cm 0 to 2,000 mS/cm 0.00 to 20.00 mS/cm 0.0 to 200.0 mS/cm
Precision:	± 0.5% of measured value ± 0.3 % FS
Display:	Liquid crystal display
Analogue output:	4 – 20 mA
Power supply:	24 VDC
Protection degree:	IP65, except for the connections for the electrodes and temperature
Mounting:	Wall mount
Dimensions:	82 x 80 x 55 mm

ARTICLE NO.	
4200	**EC flow meter** basic unit with conductivity electrode, 1 metre cable
3210	**One-inch flow fitting** Tee piece with fitting aid, screw or adhesive connection, PVC material
	Other flow fittings are available on request.

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 substrata (e.g. 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 piercing electrode made of glass comes with multiple diaphragms.

Thus, measurements can be taken in solutions, substrata, natural soils or mineral wool. This type of device is innovative because it allows you to measure temperatures in the field. A temperature probe is integrated in the conductivity electrode. So 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 to 10 mS/cm ± 5% 10 to 200 mS/cm
Display:	Liquid crystal display
Operating temperature:	+5 to 45 °C
Power supply:	One nine-volt battery, size 6LR61
Protection degree:	IP40
Dimensions and weight:	180 x 65 mm / 80 x 40/50 mm, 280 g
Dimensions and weight with case:	460 x 350 x 135 mm; 4.7 kg

ARTICLE NO.	
1201	**MULTI 2000**
	Base unit without electrode
1200	**Advisory kit, type IX** pH, conductivity, activity
	MULTI 2000 with pH piercing electrode made of glass (25 cm) with DIN connector, four-wire carbon conductivity electrode, solutions: pH 4, pH 7, 1.4 mS/cm, 12.88 mS/cm and 111.8 mS/cm, KCl filling solution, $CaCl_2$ powder for analysis in soil solutions, piercing pin, six nitrate test strips, beaker, spray bottle with deionized water
1300-M	**Advisory kit, type III** Conductivity, activity
	(functionality similar to the PET 2000 KOMBI) MULTI 2000 with four-wire carbon conductivity electrode, AM probe (25 cm) with mini-DIN connector, six nitrate test strips, calibration solution: 1.4 mS/cm, 12.88 mS/cm and 111.8 mS/cm, beaker and Spray bottle with deionized water, Technical manual
	ACCESSORIES
4097	Four-wire carbon conductivity electrode
3011	pH piercing electrode made of glass, with three diaphragms, 3 mole/l KCl, 1 metre attached cable with BNC plug
3033	pH piercing electrode made from glass, with 3 diaphragms, 3 mole/l KCl, without cable
3004	1 metre attached cable with BNC plugfor pH piercing electrode made of glass, Article No. 3033
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 connector
2005	Nitrate test strips Box with 100 strips
8102	Nitrate (each bag with 6 test 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 with deionized water
3019	One nine-volt battery, size 6LR61
4444	Technical manual
	Other calibration solutions are available on request.

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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:	460 x 350 x 135 mm; 4.9 kg

ARTICLE 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 deionized water, PET 2000 with AM probe (25 cm), 6 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 200 mS/cm
	ACCESSORIES
3011	pH piercing electrode made of glass, with three diaphragms, 3 mole/l KCl, 1metre attached cable with BNCplug
3033	pH piercing electrode made from glass, with 3 diaphragms, 3 mole/l KCl, without cable
3004	1 metre attached cable with BNC plug for pH piercing electrode made of glass Article No. 3033
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
8102	Nitrate (each bag with 6 test 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
1004	Spray bottle with deionized water
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-V 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). This device is maintenance-free.

The pH AGRAR 2000 allows you to reliably monitor the pH level. 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:	460 x 350 x 135 mm, approx. 4.4 kg

ARTICLE NO.	
1500	**Type-V 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 deionized water, PET 2000 with AM probe (25 cm), 6 nitrate test strips, technical manual
	ACCESSORIES
3011	pH piercing electrode made of glass, with three diaphragms, 3 mole/l KCl, 1metre attached cable with BNCplug
3033	pH piercing electrode made from glass, with 3 diaphragms, 3 mole/l KCl, without cable
3004	1 metre attached cable with BNC plug for pH piercing electrode made of glass, Article No. 3033
3012	ph 4.0 buffer solution, 100 ml bottle
3013	ph 7.0 buffer solution, 100 ml bottle
1004	Spray bottle with deionized water
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
8102	Nitrate (each bag with 6 test strips)
2014	Beaker for measuring volume, 100 ml with cover
4444	Technical manual
3019	One spare 9-Volt battery, size 6LR61

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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:	460 x 350 x 135 mm approx. 4.5 kg

ARTICLE 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 deionized 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 of glass, with three diaphragms, 3 mole/l KCl, 1metre attached cable with BNC plug
3033	pH piercing electrode made from glass, with 3 diaphragms, 3 mole/l KCl, without cable
3004	1 metre attached cable with BNC plug for pH piercing electrode made of glass, Article No. 3033
3012	ph 4.0 buffer solution, 100 ml bottle
3013	ph 7.0 buffer solution, 100 ml bottle
1004	Spray bottle with deionized water
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

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
Service life:	> 4 hours
Protection degree:	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

ARTICLE NO.	
7030	**7030 ion meter, complete with case**
	Base unit with multi-sensor for redox, conductivity and temperature. Includes 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-FUNCTIONAL METER 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:	four 1.5 volt batteries
Service life:	approx. 100 hours
Dimensions and weight:	63 x 40 x 26 mm, approx. 85 g
Special features:	EC/TDS selectable from 0.45 to 1.00 Temperature coefficient ß selectable 0.0 to 2.4 %/°C waterproof

ARTICLE 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

MULTI ISE

The MULTI ISE for measuring the individual nitrate, ammonium and potassium components in soil solution and ions in aqueous solutions

The Multi ISE is the versatile, robust multi-purpose tool for measuring the ion content in fluids. No filtration or clarification of the measured solution is required. Turbidity or discolouration do not affect the measurement results.

You can use the MULTI ISE to determine the pH as well as concentrations across a wide concentration range for the following ions in aqueous solution:
ammonium NH_{4+}, nitrate NO_3^-, potassium K^+, sodium Na^+, calcium Ca^{2+}, fluoride F^-, chloride Cl^-, bromide Br^-, iodide I^-, silver Ag^+, copper Cu^{2+}, nitrite NO_2^-.

This measuring instrument can measure contents in the mg/l (ppm) range – so there is no need to dilute the measured solution. The result is shown on the display in g/l with an accuracy of 0.001 g/l (1 mg/l). These concentrations can be determined with a precision level of ± 5 % of the measured result.

The MULTI ISE can also measure the individual nutrient ions most critical for agriculture: ammonium (NH_4^+), potassium (K^+) and nitrate (NO_3^-). Measurements can be made in fertilizer solutions, soil solutions (extracts), plants and organic material. The nutrients can be measured directly in the fertilizer solution.
A simply slurry solution made with deionized water (or better yet, an extraction solution recommended by LUFA – the German Agricultural Testing and Research Institute) will suffice to determine the ion concentrations in substrata and soils. An extraction solution consisting of alum KAl $(SO_4)_2$ is used for nitrate. For ammonium and potassium, an extraction solution of calcium chloride $CaCl_2$ is used.

The MULTI ISE is microprocessor-controlled and easy to use. The corresponding electrode (ammonium, nitrate or potassium) is first connected to the instrument and then immersed together with the reference electrode into the solution being measured. The instrument references the on-board calibration data corresponding to that measurement.

The menu-driven calibration process is self-explanatory. The required calibration solutions and the technical manual are included in the kit.

The enclosure is waterproof (resistant to splashed water).

TECHNICAL SPECIFICATIONS:

Measured quantities:	ammonium NH_4, nitrate NO_3, potassium K, sodium Na, calcium Ca, fluoride F, chloride Cl, bromide Br, iodide I, silver Ag, copper Cu, nitrite NO_2
Measurement range:	to min. 10 g/l
Precision:	±5 %
Display:	LCD
Operating temperature:	During operations: +5 to 45 °C
Power supply:	One nine-volt battery, size 6LR61
Service life:	approx. 100 hours
Protection degree:	IP40
Dimensions and weight:	125 x 75 x 45 mm, 190 g
Dimensions and weight with case:	460 x 350 x 135 mm, approx. 5.0 kg

ARTICLE NO.	
1901	**MULTI ISE**
	Base unit without electrode
1900	**MULTI ISE advisory kit** with ammonium, potassium and nitrate electrodes
	with calibration solutions, refill solution for electrodes with filler syringe, conditioning solutions, powder for extraction solutions, spray bottle with deionized water and manual
	ACCESSORIES
118006	Ammonium selective electrode
114006	Nitrate selective electrode
134006	Potassium selective electrode
136006	Sodium selective electrode
102006	Calcium selective electrode
110006	Fluoride selective electrode
104006	Chloride selective electrode
100006	Bromide selective electrode
106006	Iodide selective electrode
116006	Silver selective electrode
112006	Copper selective electrode
138006	Nitrite selective electrode
126006	Reference electrode, double bridge
3035	ISE / reference cable, one metre
1904	Calibration solution 180 mg/l NH_4, 50 ml bottle
1905	Calibration solution 18 mg/l NH_4, 100 ml bottle
1917	Calibration solution, 620 mg/l NO_3, 100 ml bottle
1916	Calibration solution, 62 mg/l NO_3, 100 ml bottle
1906	Calibration solution, 390 mg/l K, 100 ml bottle
1907	Calibration solution, 39 mg/l K, 100 ml bottle
2027	Refill solution with filler syringe for electrodes, 0.1 mole/l KCl, 100 ml bottle
1908	Conditioning solution for NH_4 (1 mole/l NH_4Cl), 50 ml bottle
2024	Conditioning solution for K and NO_3 (1 mole/l KNO_3), 50 ml bottle
0504	Calcium chloride ($CaCl_2$) for soil analysis (approx. 11.1 g for 10 l solution 0.01 mole/l)
2035	Alum powder for 5 l extraction solution, for NO_3 , 50 g
1004	Spray bottle with deionized water
3019	One nine-volt battery, size 6LR61
	Other calibration solutions are available on request.

NITRAT 2000

2019

NITRAT 2000 advisory kit

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 deionized water in order to measure substrata and soil. Turbidity does not have an effect on the measurement results. Nitrate contents up to 1,000 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). We recommend that you use our Nitrat 2000 Advisory Kit when preparing your test samples (art. no. 2011). It contains all the necessary accessories, as listed below.

NITRAT 2000 soil kit

Soil 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 soil 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 1,000 mg/l
Resolution:	NO_3: 1 mg/l
Precision:	NO_3: ±5 %
Display:	Liquid crystal display
Operating temperature:	During operations: +5 to 45 °C
Power supply:	One nine-volt battery, size 6LR61
Service life:	approx. 100 hours
Protection degree:	IP40
Dimensions and weight:	125 x 75 x 45 mm, 190 g
Advisory kit	
Dimensions and weight with case:	370 x 290 x 90 mm, approx. 3.2 kg
Soil kit	
Dimensions and weight with case:	550 x 410 x 180 mm, approx. 4.5 kg

2011

ARTICLE NO.	
2008	**NITRAT 2000**
	Base unit without electrode
2019	**NITRAT 2000 advisory kit**
	NITRAT 2000 with nitrate electrode, 100 ml each of calibration solutions 500 and 50 mg/l NO_3, 100 ml refill solution of 0.1 mole with filler syringe, 100 ml conditioning solution, salt for extraction solution/alum, spray bottle with deionized water, beaker
2011	**NITRAT 2000 soil kit**
	NITRAT 2000 with nitrate electrode, 100 ml each of calibration solutions 500 and 50 mg/l NO_3, 100 ml refill solution (0.1 mole KCl) with filler syringe, 100 ml conditioning solution, salt for extraction solution/alum, spray bottle with deionized water, 1 litre beaker, hand mixer, electronic precision scale, fluted filter, strainer with drip tray, six powder funnels (∅ 120 mm), six extraction bottles (0.5 litre), beaker, plastic shovel
	ACCESSORIES
180101	Nitrate selective combination electrode 1 metre of attached cable, BNC plug
2018	Calibration solution 500 mg/l NO_3, 1 litre bottle
2023	Calibration solution 50 mg/l NO_3, 1 litre 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 with deionized water
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 fluted filters (ø 240 mm) for analysis
2031	Powder funnel, ø 120 mm
3019	One nine-volt battery, size 6LR61

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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.

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

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.

ARTICLE NO.	
2016	**AGROS NOVA measuring instrument for liquid manure**
	AGROS NOVA complete in case, with reagent, pH booster, areometer (density hydrometer) and measuring spoon
	ACCESSORIES
2097	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

ARTICLE NO.	
2007	**Hand-held sampling pliers**

NITRACHEK ADVISORY KIT 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 indispensable tool in many countries. New: The previous 20 measurements are saved with date and time stamps. There is a new automatic corrective-factor multiplication feature. 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.

TECHNICAL SPECIFICATIONS:

Dimensions and weight of case:	550 x 410 x 180 mm approx. 6.6 Kg

ARTICLE NO.	
2002	**Nitrate/nitrogen advisory kit**
	ACCESSORIES
2009	Scope of delivery: Reflectometer, Nitrachek, calibration solution 100 mg/l NO_3 (20 ml), 1 bag of 6 nitrate test strips, 1 operating instructions
2010	Calibration solution 100 mg/l NO_3, 20 ml bottle
2005	Nitrate test strips Box with 100 strips
2006	100 circular filters, ø 150 mm
2030	Wide-neck extraction bottle, 1.0 litre, with top
2014	Beaker for measuring volume, 100 ml with cover
2012	Manual and operating instructions
2550	8 reaction vessels with stands and dosage syringe
0810	Soil strainer with wooden frame, 4 mm / 330 x 190 mm with drip pan
4060	Manual scale, 0 to 1,000 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

Possible steps in the process

TAKING THE SAMPLE

HOMOGENIZATION

1a) Using sieves to homogenize the soil sample

+

and: weighing the soil sample to determine the nutrient content in mg/kg

Or

SINGLE SAMPLE SUBSTRATE

1b) Measuring the sample volume with the graduated sample container (e.g. for horticulture gardening substrata)

Or

SINGLE SAMPLE MINERAL SOILS

1c) Measuring the sample volume using the graduated sampling auger (e.g. for mineral soils)

PREPARING THE SAMPLE

2) Adding an extraction agent to the sample with extracting agent

3) Extraction by repeated shaking

4) Filtration of the extract using a round filter

5) Measuring the filtrate with a graduated plastic syringe

ANALYSIS OF SAMPLES

6) Fill the measuring cuvette.

7) Add a defined number of drops of the colour reagent.

8) Add the reactant.

9) Insert the cuvette into the AMOLA® base unit. Read the measured value directly in kg/ha (mineral soils) or mg/l of substrate (for substrates), or ...

Hand model: Sarah Tobehn

Measurement range*

	Mineral soils		Horticulture substrates	Water samples	Precision
Parameter	**kg/ha**	**mg/kg**	**mg/l of substrate**	**mg/l**	**%**
NH_4	4 – 80	1 – 26	13 – 260	> 0.1	± 5
NH_4-N	3 – 60	1 – 20	10 – 200	> 0.1	± 5
NO_3	130 – 1,850	40 – 620	90 – 1,230	> 4	± 10
NO_3-N	30 – 420	10 – 140	20 – 280	> 1	± 10
PO_4	180 – 4,500	60 – 1,500	60 – 1,500	> 0.6	± 1
PO_4-P	60 – 1,500	20 – 500	20 – 500	> 0.2	± 1
P_2O_5	138 – 3,450	46 – 1,150	46 – 1,150	> 0.5	± 1
K	120 – 900	40 – 300	40 – 300	> 2	± 5
K_2O	144 – 1,080	48 – 360	48 – 360	> 2.5	± 5

* For higher levels out of the measurement range (e.g. 500 mg/l NO_3-N), you should dilute the filtrate with distilled water (e.g. 1:2). The measured result must then be multiplied by the dilution factor (e.g. 250 mg/l *measured* x 2 = 500mg/l)

Contents of the AMOLA® AGRAR MOBILE LAB case:

Case, Amola base unit, sampling auger, sieve, drip pan, shovel, spatula, scale with weight, filter, measuring cylinder (100 ml), measuring cup (250 ml), funnel, bottle (0.5 l), sample vessels (15 and 50 ml), syringe (5 ml), four glass cuvettes, 1 litre of $CaCl_2$, 2 x 1 litre of CAL, 1 litre of distilled water, nitrite test strips, Visocolor test for ammonium, nitrate, phosphate and potassium, sedimentation tube, glass tamper, pyrophosphate solution

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AMOLA® AGRAR MOBILE LAB with accessories

Using the AMOLA® for photometric determination of NPK

The AMOLA® Agrar Mobile Lab contains all the key reagents, equipment and accessories that you need to make a quick, easy and reliable assessment in the lab or in the field. It can be used to determine any of the main readily soluble, plant-available nutrients: nitrogen, phosphorus and potassium (NPK). It is useful for agriculture, horticulture, tree nurseries and composting plants applications. Consultants and plant production specialists also make use of the AMOLA®.

After a sample is taken, the ammonium NH_4, nitrate NO_3, potassium K and phosphate PO_4 in the soil are converted by extraction into liquids and treated with a specific colour reagent. The intensity of the colour indicates the quantity found in the soil of each of these substances.

The AMOLA® base unit provides you with an objective determination of the colour intensity. The sample type (e.g. mineral soil, substrate, water) and the desired soil component are first specified – then the desired measurement is displayed using the relevant units. For mineral soils, the displayed unit is kg/ha (kilograms per hectare) or mg/kg soil (milligrams per kilogram). For horticulture substrates the unit is in mg/l of substrate (milligrams per litre), and for water samples the unit is mg/l (milligrams per litre).

Ammonium can be specified as NH_4 and NH_4; nitrate can be specified as NO_3 and NO_3-N. The total nitrogen is determined from the sum of the ammonium- and nitrate-nitrogen (NH_4-N + NO_3-N). Phosphate is calculated as PO_4, PO_4-P or P_2O_5; potassium is calculated as K or K_2O.

The manual (included here) uses simple illustrations to describe the sampling, processing, extraction and analysis methods.

TECHNICAL SPECIFICATIONS for the photometer:

Type:	LED photometer: microprocessor controlled, with auto-test and auto-calibration
Lens:	LED + 2 inference filters
Wavelengths:	450 nm (NO_3-N), 660 nm (NH_4-N, PO_4-P, K)
Precision:	±2 nm, half-width of 10 to 12 nm
Cuvette holder:	Round cuvettes with 16 mm outer diameter Insensitive to ambient light Measurements with uncovered cuvette shaft are possible
Detector:	Silicon photocell
Display:	Illuminated graphical display, 64 x 128 pixels
Usage:	Easy to use with icons on the display Pre-programmed tests for VISOCOLOR® ECO tests Result with dimension specification, date, time
Data storage capacity:	50 measurements
Interface:	Mini USB Free software updates via internet/PC
Operating range:	5 to 50°C at 90% relative humidity
Power supply:	3 AA batteries, rechargeable batteries USB interface; optional internal battery pack
Housing:	Waterproof, IP67 (30 min, 1 m)
Dimensions and weight of case:	550 x 410 x 180 mm, approx. 10.2 kg

ARTICLE NO.	
1806	**AMOLA AGRAR MOBILE LAB with accessories**
	Contents: see box at left side
1828	**AMOLA AGRAR MOBILE LAB, base unit**
	ACCESSORIES
5001	Sampling auger with volume graduations
2049	Plastic shovel
2057	Spatula
0810	Strainer, 33 x 19 cm, 4 mm with drip pan
4066	High-precision scale: 0 – 500 g with calibration weight
2006	Round filter, MN 615 diameter 150 mm, 100 per package
0570	100-ml graduated cylinder, with graduated scale
2044	250-ml graduated cylinder, with graduated scale
2043	Powder funnel, 80 mm diameter
2029	Wide-neck extraction bottle, 0.5 litre, with top
2058	Sample container, 50 ml, with screw cap and graduated scale
2059	15-ml sample container, with screw cap and graduated scale
2060	5-ml plastic syringe with 0.2 ml graduation marks
2061	Four MN 10-ml cuvettes with screw cap
1876	$CaCl_2$ extraction concentrate, 1 litre rectangular bottle
1877	CAL extraction concentrate, 1 litre rectangular bottle
2091	Distilled water, 1 litre rectangular bottle
2070	Nitrite test strips, Quantofix (100 tests)
2092	Measuring spoon for Visocolor tests
1886	Visocolor® ECO ammonium 3 (approx. 50 tests)
1895	Visocolor® ECO nitrate (approx. 110 tests)
1889	Visocolor® ECO phosphate (approx. 80 tests)
1883	Visocolor® ECO potassium (approx. 60 tests)
2093	Sedimentation tube
2095	Glass tamper for the sedimentation analysis
2096	Pyrophosphate solution for the sedimentation analysis

STELZNER® soil kit – Preparation of test samples

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 pages 19 and 52 for comparison to other photometers) 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.

Contents of the STELZNER® soil kits

Case, sampling auger, 2-mm strainer with drip pan, precision scale, spray bottle with deionized water, two funnels, 100 fluted filters, four extraction bottles, 100-ml beaker, two 250-ml beakers and two 400-ml beakers, six volume-measuring beakers with covers, 500-ml screw-top can, plastic syringes, glass stirring rods, four 0.5-litre extraction bottles, two plastic shovels, metal scoop, cuvette cell stand with 16 empty 1-litre reagents, Extraction concentrates $CaCl_2$ and CAL

ARTICLE NO.	
1875	**STELZNER® soil kits**
	ACCESSORIES
1876	$CaCl_2$ extraction concentrate, 1 litre bottle, for producing the extraction solution
1877	CAL extraction concentrate, 1 litre bottle, for producing the extraction solution
2033	100 fluted filters for the analysis process, ø 240 mm
2026	Cuvette cell stand
0810	Strainer, 33 x 19 cm, 4 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	Graduated cylinder, 100 ml, PE, tall shape
2044	Beaker, 250 ml, with grading scale
2045	Beaker, 500 ml, with grading scale
2046	Screw-top can, 500 ml
2048	Glass stirrer, ø 10 mm, approx. 15cm
2049	25-ml plastic shovel
2051	Metal scoop, flat surface and spoon

NUTRIENT ANALYSIS CHAPTER 7

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 21) 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.

ARTICLE NO.	
1861	VISOCOLOR® ECO test kit with colour disc, potassium 2 mg to15 mg/l K
1862	VISOCOLOR® ECO test kit with colour disc, ammonium 0.5 mg to 15 mg/l NH_4
1863	VISOCOLOR® ECO test kit with colour disc, phosphate 0.2 mg to 5 mg/l PO_4
1864	VISOCOLOR® ECO test kit with colour disc, nitrate1 mg to 120 mg/l NO_3

Indicators: refer to page 21

TEL ++49(0)36601/93 49 06 FAX ++49(0)36601/93 49 07 WWW.STELZNER.DE

Indicators

Additional components or custom packs are available on request.

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 include, for example, 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:	Callcium 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 – 14, 1-pH divisions
Measurement range:	pH test
Divisions:	2 – 9, 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 2.5 mg/l
Measurement range:	Zinc Zn
Divisions:	0 – 10 – 25 – 50 – 100 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

ARTICLE NO.	
2071	**Ammonium*** (100 tests)
2073	**Calcium*** (60 tests)
2074	**Carbonate hardness** (100 tests)
2072	**Chloride** (100 tests)
2068	**Sensitive chlorine** (100 tests)
2075	**Iron (100 tests)**
2076	**Potassium*** (100 tests)
2077	**Copper** (100 tests)
2085	**Multi-stick for aquarium usage** (100 tests)
2005	**Nitrate Merckoquant** (100 tests)
2069	**Nitrate/Nitrite** (100 tests)
2070	**Nitrite** (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)
8400	**Oil test** (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** (each 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 soil test kit** (four bags nitrate and four bags pH, with 6 test strips, beaker, 20 round filters, funnel)
8302	**Water hardness** (each bag with 6 test strips)
8102	**Nitrate** (each bag with 6 test strips)
8402	**Oil test** (each bag with 6 test strips)
8602	**Hazardous substance test** (each bag with 6 test strips)
8502	**Indicator set** (Bags of nitrate, water hardness and pH, each with 6 test strips)

MEASURING FOOD

Refractometers

For wine, honey, fruit juices and alcohol

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.

It's 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.

The model MRHW25ATC can be used to measure for alcohol.

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
	Model RHW-25ATC
Measurement range:	0 – 25% potential alcohol (NOT finished alcohol) 0 – 40% Brix
Resolution:	0.2% Al, 0.20% Brix
Precision:	± 0.2% Al, ± 0.20 % Brix
Dimensions and weight:	175 x 30 mm, approx. 165 g

ARTICLE NO.	
4041	**MR200ATC refractometer**
4049	**MR90ATC refractometer**
4106	**MRHW25ATC refractometer**

Digital Refractometer

For wine, honey and fruit juices

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 device calibration using deionized 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
Service life:	approx. 5000 measurements
Protection degree:	IP65
Dimensions and weight:	192 x 102 x 67 mm, approx. 420 g

ARTICLE NO.	
4045	**Digital Refractometer**

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 cm^2 0.5 cm^2
Dimensions and weight:	112 x 59 x 24 mm, approx. 106 g
Dimensions and weight with pouch:	146 x 74 x 33 mm, approx. 250 g

ARTICLE NO.	
4610	**Fruit penetrometer**
	Base unit with 2 puncture tips, splatter guard, peeler and pouch

MEASURING FRUIT SIZE

Fruit rings / sorting calibres

4621

4620

Size determination with sorting templates

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

ARTICLE NO.	
4620	**Sorting calibre** 10 – 50 mm
	9 compartments, stainless steel ± 0.5 mm, 5 mm steps
4621	**Sorting calibre** 60 – 110 mm
	11 compartments, stainless steel, ± 0.5 mm, 5 mm steps
4622	**Sorting calibre** 30 to 70 mm
	11 compartments, aluminium 5 mm steps

Potato template

Size determination with sorting templates

Potato sorting templates feature multiple variable-sized compartments for quickly determining the size.

TECHNICAL SPECIFICATIONS:

Measurement precision:	± 0.5 mm
Material:	Stainless steel
Measuring slots:	30 to 70 mm
Compartments	11 sections

ARTICLE NO.	
4623	**Potato template**

Calibre for sorting asparagus

For measuring asparagus stalks

For measuring the length and thickness of asparagus stalks.

TECHNICAL SPECIFICATIONS:

Colour:	white asparagus: white green asparagus: black
Measurement precision:	± 0.5 mm
Material:	Plastic
Measuring slots:	White asparagus: 10, 12, 14, 16, 18, 26, 36 mm Green asparagus: 3, 6, 8, 10, 12, 14, 16, 18, 20, 26, 36 mm
Length determination:	White asparagus: 12, 17, 22 cm Green asparagus: 10, 12, 17, 22, 27 cm

ARTICLE NO.	
4640	**Calibre for sorting asparagus** Green asparagus
4641	**Calibre for sorting asparagus** White asparagus
	Sorting templates for tomatoes, soft fruits, nuts and peaches/nectarines are available on request.

FRUIT ANALYSIS CHAPTER 9

MEASURING FRUIT SIZE

All-purpose sizing ring

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 (sizing ring) with flexible adjustment: for continuously variable measurement of fruit size from 20 mm to 100 mm circumference.

Photography: © Annett Just

ARTICLE NO.	
4630	**All-purpose sizing ring** 32 mm to 95 mm, metal, with pouch
4631	**All-purpose sizing ring** 20 mm to 100 mm, plastic

SOIL MEASUREMENTS

Oxygen/temperature lance

Oxygen and temperature analysis for composting

In industrial composting plants, oxygen concentrations and temperature must be monitored in order to optimize the decay process. The oxygen lance, equipped with an amperometric Clark O_2 sensor, can reliably measure 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.
Measurements can be taken directly on site when used in conjunction with the AM 40 hand-held meter (refer to page 26). The stationary MV 5030 meter (refer to page 26) can be used for a variety of control solutions. It can also be connected to the event reporting system (refer to page 47).

ARTICLE NO.	
4520	**Oxygen/temperature lance for measurements in soil** Lance, hand-held AM 40 instrument, accessories

TECHNICAL SPECIFICATIONS:

	O_2 sensor
Measurement range:	O_2: 0 to 25 vol. % Temperature: 5 to 80 °C
Operating temperature:	5 to 80 °C
Air humidity:	max. 100% relative humidity – but with no condensation on the sensor membrane
Dimensions:	Shaft length: approx 100 mm Shaft diameter: 18 mm
Material:	FEP, 1.4571 stainless steel, POM
	Oxygen/temperature insertion probe
Material:	Stainless steel WS 1.4571 (DIN 17440), certified crystal alloy for special requirements
Operating temperature:	0 to 80 °C
Dimensions:	ø 22 mm (shaft), approx. 28 mm (tip), Total length: approx. 1,100 mm
Weight:	Approx. 2.5 kg

GAS ANALYSIS CHAPTER 10

AMBIENT AIR MEASUREMENTS

Carbon dioxide measuring transducer

Carbon dioxide measuring transducer

The carbon dioxide measuring transducer is excellent for use in demanding applications. The factory-set multi-point CO_2 and temperature adjustments ensure outstanding CO_2 measurement accuracy over the entire temperature range. So it can also be used outdoors. The CO_2 sensor uses NDIR two-beam technology which makes it very insensitive to contamination. Ageing effects are compensated for automatically so it has excellent long-term stability. The EE820 has a sturdy, functional housing with a special built-in filter which allows it to be used in dirty environments, such as in farms or stables. The measured CO_2 values (with a measuring range up to 10,000 ppm) can be output via the analogue current or voltage outputs.
It can also be connected to the EMS event reporting system (refer to page 47).

TECHNICAL SPECIFICATIONS:

Measurement range: (specify when ordering)	from 0 to 2000 ppm or from 0 to 5000 ppm or from 0 to 10000 ppm
Measurement technique:	NDIR
Precision:	0 to 2000 ppm < ± (50 ppm +2% meas. value) 0 to 5000 ppm: < ± (50 ppm +3% meas. value) 0 to 10000 ppm: < ± (100 ppm +5% meas. value)
Response time t_{63}:	300 seconds
Output:	4 – 20 mA
Operating temperature:	-20 to 60 °C
Power supply:	15 to 35 VDC
Protection degree:	IP 54
Dimensions:	101 x 81 x 46 mm

ART.-NR.	
4510	**CO_2 Measuring transducer**

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:

Measurement range:	CO_2: 0 to 10,000 ppm Air humidity: 0 to 90 % rel. humidity Temperature: -20 to +50 °C
Precision:	CO_2: ±50 ppm + 5 % meas. value Air humidity: ±5 % meas. value Temperature: ±1°C
Dimensions and weight:	115 x 108 x 63 mm, 180 g
Power supply:	230 VAC / 60Hz / 5 VDC

ARTICLE NO.	
4500	**SenseLife monitor of room air**

Carbon dioxide meter

Mobile carbon dioxide measurement

This meter is a precise instrument with a 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.

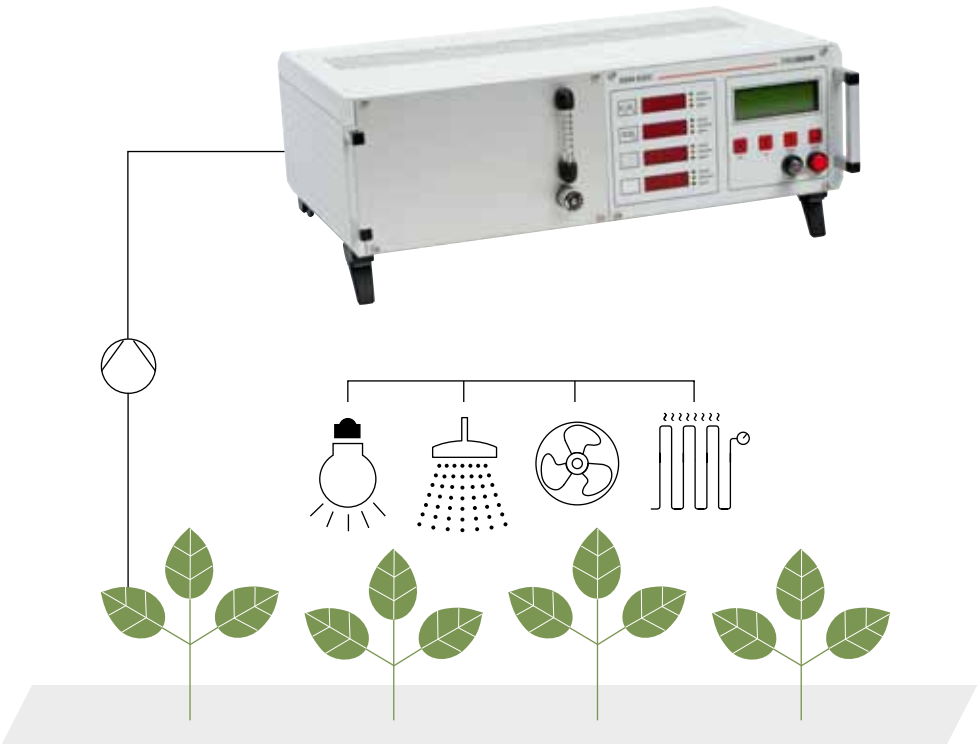
TECHNICAL SPECIFICATIONS:

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

ARTICLE NO.	
4344	**Carbon dioxide meter**
	ACCESSORIES
4034	TOP-SAFE Protection against impacts and dirt
4039	Log printer

Phyto monitoring

ARTICLE NO.	
6000	SSM 6000 Phyto



Example of usage:
Fully automatic continuous monitoring of plant physiological data in tomato greenhouses: for improving the yield or discovering energy saving potential. Integration of the data obtained into the greenhouse control mechanism.

Measured data collected:
– CO_2 gas changes (photosynthesis, respiration)
– Leaf temperature
– Photosynthetically active radiation (PAR)
– Global radiation
– Leaf transpiration

Gefördert durch:
Bundesministerium für Wirtschaft und Technologie
aufgrund eines Beschlusses des Deutschen Bundestages
ZIM Zentrales Innovationsprogramm Mittelstand

Photography: © Tassilo Gast

Measurements of ethylene and carbon dioxide in plants and crops

The SSM 6000 Phyto stationary analysis system is used for continual measurements of ethylene and carbon dioxide in plants and crops.

Using gas exchange measurements on plant parts (such as on leaves or fruits), it is possible to determine information on plant growth and biological activity. Conditions for plant growth can be optimized and resource usage can be minimized by measuring the concentrations of ethylene and carbon dioxide.

The limit values for plant stress conditions can be determined using these measured variables. This information can then be used in conjunction with an automation system to provide process control within the greenhouse.

TECHNICAL SPECIFICATIONS:

Measurement range:	
C_2H_4	10 ppm
CO_2	2,000 ppm
Measurement technique:	
C_2H_4	Electrochemical sensor
CO_2	NDIR measurement
Resolution:	
C_2H_4	1 ppb
CO_2	0.1 ppm
Repeat accuracy:	
C_2H_4	2% of measured value
CO_2:	2% of measured value
Detection limit (2σ~):	
C_2H_4	2 ppb
CO_2	2 ppm
Long-term stability:	
C_2H_4	high long-term stability
CO_2	high long-term stability with proCAL
Display:	4-character LED display, status screens, 4-character LCD display
Communication port:	RS232, 4 to 20 mA
Operating temperature:	+5 to +40°C
Power supply:	AC 85-264 VAC, 47-63 Hz
Protection degree:	IP40
Dimensions and weight:	300 x 400 x 165 mm, approx. 10 kg
Options:	Profibus DP, several measuring points, etc.
Special features:	Data storage

PORTABLE LIQUID MEASUREMENTS

TM 40, ISE 40, LF 40, AM 40

Measures pH, redox, ion concentrations, conductivity and dissolved gases

These measuring devices offer the advantages of a mobile field unit together with the precision and comfort of a laboratory instrument: with high measurement accuracy, a multifunction graphic display, integrated data logger and heavy-duty IP65 housing.
The important GLP functions – such as date/time, primary measured value, secondary measured value (including the physical units), temperature and device number – are transmitted and recorded in the data file. The devices for O_2, pH, ISE and LF have an automatic temperature compensation feature.

TECHNICAL SPECIFICATIONS:

Measurement range:	**TM** 40: pH 0 to 14; -1999 to 1999 mV; **ISE** 40: 0.1 to 1,000 mg / l **LF 40:** LF 0 to 200 µS/cm; 0 to 2,000 µS/cm; 0 to 20 mS/cm; 0 to 500 mS/cm; automatic measuring range switch-over; **TDS:** 0 to 200 mg/l; 0 to 2,000 mg/l; 0 to 20 g/l; 0 to 500 g/l; Salinity: 0 to 70 g/kg; **AM 40:** O_2 0 to 200 %; 0 to 20 mg/l
Resolution:	**TM 40:** 0.01 pH; 1 mV **ISE 40:** 0.1 mg/l **LF 40:** 0.1 µS; 1 µS; 0.01 mS; 0.1 mS **AM 40:** 1 %; 0.01 mg/l, Temperature: 0.1°C
Precision:	**TM 40:** ± 0.02 pH; ± 1 mV **LF 40:** ± 1% to 200 mS **AM 40:** ± 1 %; +/- 0.01 mg/l
Display:	graphic LCD, 128 x 64 pixels, back-lit
Communication port:	USB, electrical/galvanic isolation
Data logger:	4,000 data records
Power supply:	Three AA batteries, IEC R6, LR6, 1.5V
Protection degree:	IP65
Dimensions and weight:	200 x 95 x 40 mm, approx. 290 g

ARTICLE NO.	
7130	**TM 40 set for pH**
7140	**ISE 40 Set** (NH_4, NO_3, Cl, F, Cu, Ca, CO_2, etc.)
7120	**LF 40 set for conductivity**
7110	**AM 40 set for oxygen**

Each measuring instrument is delivered in a set together with probe/electrode, solutions and spare parts (AM 40) in a case.

LM 3000

Measures pH, redox, ion concentrations, conductivity and dissolved gases

The LM 3000 multi-parameter laboratory controller has a modular bus structure; it provides excellent functionality, maximum operational reliability, outstanding ease of use, and a wide range of customized configuration options.
The LM 3000 offers a complete system solution whenever several electrochemical quality parameters need to be detected on-line in a laboratory setting, and where these measurements need to be transmitted and evaluated very reliably.

TECHNICAL SPECIFICATIONS:

Auxiliary power:	24 VDC desktop power supply unit, voltage cut-off switch on the device
Ambient temperature:	0 to +40 °C
Display:	Graphic touch-screen display 320 x 240 pixels, 256 colours, backlit
Menu languages:	German, English
Data transfer:	Ethernet interface, USB interface for PC connection, serial interface RS-232
Control outputs:	4 potential-free relay outputs; resistive load of I ≤ 1 A, U ≤ 24 V DC for limit or alarm function; one relay with timer function (washing contact; time interval is adjustable from 1 to 9,999 hours)
Data storage:	built-in data logger for 100,000 values, including date and time, finite / ring storage, 48-hr data recorder
Log book:	approx. 200 activities, including date and time
Housing:	Aluminium console housing IP40/DIN EN 60529
Connections:	BNC, banana, 8-pin DIN, BK, USB, Ethernet
Measuring modules:	four internal measuring modules; can be combined as needed; galvanic-isolated inputs; storing of calibration data; sensor monitoring using adjustable limit ranges; manual and automatic temperature compensation;
Controller module:	PID 3000, standard signal module 4 x 0(4) to 20 mA
GLP:	GLP functionality (data recording)

ARTICLE NO.	
LM3000	**Multi-parameter controller base unit**

Measuring module for pH, conductivity, ISE etc.: available on request

STATIONARY LIQUID MEASUREMENTS

MV 50XX series

MV 50XX single-channel measuring transducer

The MV 50XX series of measuring transducers is perfect for taking stationary measurements directly at the measuring point in the open field. The measuring transducer is simple and intuitive to use. It also maintains the essential functionality with maximum operational reliability and safety. Each MV50XX features a large OLED display and plain-text menu navigation. The software also enables you to configure, calibrate, view and record measured values at your PC using a USB port.

Areas of use:
- Water hardness
- Water quality measuring systems
- Process monitoring
- Process control

Special features:
- Cost-effective measurement of process variables
- Easy to use (plain text menus)
- Simultaneous temperature measurements and compensation
- Two scalable analogue outputs and two relay outputs
- USB interface and PC software
- Firmware update via USB, field housing with IP65 protection

Connection to the event reporting system (refer to page 47) is possible.

TECHNICAL SPECIFICATIONS:

Parameters:	1 x pH, redox, conductivity, O_2, ISE (NH_4, NO_3, K, Cl, F, etc.)
Display:	graphic OLED, 128 x 64 pixels with plain text menu
Analogue outputs:	Two 0(4) to 20 mA, or two 0 to 5 V
Control outputs:	2 limit switch contacts, CO contact, max. 250 V AC / 5 A; PID controller, bi-directional (pulse length or analogue controller)
Interface:	USB (optional RS-232)
Power supply:	100 to 240 V AC, 18 to 36 V DC
Housing:	Aluminium housing for wall mount
Protection degree:	IP65
Dimensions:	W 160 x H 130 x D 70 mm

ARTICLE NO.	
MV5010	**pH measuring transducer** 0 to 14 pH
MV5020	**LF measuring transducer** 0 to 20 mS/cm
MV5016	**ISE measuring transducer** NH_4, NO_3, etc.
MV5030	**O_2 measuring transducer** 0 to 20 mg/l
MV5050	**CO_2 measuring transducer** 0 – 3,000 mg/l

The measuring transducer is not delivered with electrodes or cables. Please order separately.

INDUSTRIAL WEATHER STATION

COMPACT weather station

ARTICLE NO.	
4700	**COMPACT weather station**

Affordable variant for collecting meteorological measurements

Building technology:
- Building automation
- Greenhouse control
- Can be integrated into existing control systems
- With digital interface
- Precise and reliable
- Wear-free
- Easy installation

The Compact weather station is designed to meet the diverse demands of building control systems. This device combines precision data acquisition with a very compact design. It is easy to install into new and existing installations. Although it is extremely compact, a total of 11 meteorological parameters can be recorded. No movable parts are used for measuring the wind. The thermal anemometer measures wind speed and wind direction without any mechanical wear. So there is no need for complex maintenance work.

The integrated GPS module automatically detects the date, time, station height and geographical position. The time does not need to be set manually. The weather station calculates the azimuth and elevation of the sun's position from its GPS parameters. The reduced air pressure is calculated using the height above sea level and the measured air pressure. All parameters are output using a data telegram.

The weather station can be mounted directly on a mast or building (using a wall bracket).

TECHNICAL SPECIFICATIONS:

Wind speed	
Type:	Thermal anemometer
Measurement technique:	0 to 30 m/s
Resolution:	0.1 m/s
Accuracy with laminar flow:	±5% (±1.5 m/s)
Wind direction	
Type:	Thermal anemometer
Measurement range:	0 to 360 °C
Resolution:	1 °C
Accuracy with laminar flow:	±10 °C
Brightness	
Type:	Silicon sensor (north, east, south, west)
Measurement range:	0 to 150 kLux
Resolution:	0.1 kLux
Precision:	±3% (±4.5 kLux)
Spectral range:	475 to 650 nm
Twilight	
Type:	Silicon Sensor
Measurement range:	0 to 500 lux
Resolution:	1 lux
Precision:	±10 lux
Global radiation	
Type:	Silicon Sensor
Measurement range:	0 to 1300 W/m²
Resolution:	1 W/m²
Precision:	± 10% (± 130 W/m²)
Spectral range:	350 to 1100 nm
Precipitation	
Type:	Conductivity measurement
Measurement range:	0/1 (precipitation: yes/no)
Heating capacity:	Dry sensor: 0.1 W (condensation protection)
	Wet sensor: 1.1 W (active drying)
Drying phase:	3.5 minutes
Temperature	
Type:	PT1000
Measurement range:	-30 to +60 °C
Resolution:	0.1 °C
Accuracy at WG > 2 m/s and temperature -5 °C to +25 °C:	±1°C

Relative Air humidity	
Measurement range:	0 to 100 %
Resolution:	0.1 %
Precision:	± 10% @ 10 to 90%
Air pressure	
Type:	Piezo resistive
Measurement range:	300 to 1100 hPa
Resolution:	0.01 hPa
Precision:	± 0.5 hPa @ 20 °C
Long-term stability:	± 0.1 hPa / year
GPS receiver	
Received data:	Latitude, longitude, date/time, station heigh
Positional accuracy:	3 metres (50% CEP)
Digital interface	
Type:	RS485
Operating mode:	Half-duplex mode
Data format:	8 N1
Baud rates:	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
Protocol:	MODBUS RTU
General information	
Operating voltage:	18 to 30 V AC/DC, 50/60 Hz
Power consumption:	< 300 mA @ 24 V DC
Temperature:	-30 to +60 °C
Time:	GPS receiver with battery-backed real-time clock for about 3 days
Housing	
Material:	PC
Mast support:	25 mm pipe diameter
Dimensions:	ø 130 mm x 67.5 mm
Weight:	0.22 kg
Protection:	IP64 when in usage position
Connection:	5-pole plug

WIRELESS WEATHER STATION

OPUS wireless weather station

For measuring temperature, air humidity, rain quantity, wind strength, wind direction and air pressure

The PRIMUS weather station covers all the requirements needed for state-of-the-art weather recording. Its feature set, such as the seamless method of transferring weather data to a PC, defines a new standard of excellence. Measurement from the weather station's outdoor sensors are clearly displayed on a large easy-to-read screen. This gives you an immediate overview of all key data, while the display of additional measurements can also be activated as needed. The outdoor units can be positioned wherever you need them because they have a wireless connection to the base station Data can be be transmitted from 50 to 100 metres over a secure 868 MHz frequency band. The Heavy Weather Pro software enables you to use a PC for monitoring and saving weather data that you receive using the USB transceiver (included). Multiple sensors can be positioned to send indoor and outdoor measurements to your weather station, which you can then monitor and save on your PC. You can also use this application to create tables and graphs, analyze historical data, and identify trends and tendencies.

The transmission range is:
- Thermo-hygro sensor: approx. 100 m
- Rain sensor and wind sensor: approx. 50 m
- Wireless transmission of outdoor measurements via 868-MHz transmitter
- Displays: indoor and outdoor tempeture, raindoor and outdoor humidity, absolute and relative air pressure, air pressure tendencies, rainfall amount, wind speed and wind direction, windchill factor and dew point.
- Graphical display of the air pressure curve for the last 72 hours.
- Weather forecast with max-min functions.
- Programmable alarms (temperature, storm, etc.)
- Clock and date display with PC update function.
- Storage memory for up to 1,750 weather records.
- Wireless connection to USB port on PC.
- Can be completely controlled via PC.
- Measurements can be processed using your own software or Excel on Windows XP or Vista.

TECHNICAL SPECIFICATIONS:

Power supply:	Base unit: Three 1.5-V LR14 batteries
	Thermo-hygro sensor: Two 1.5 V C batteries
	Rain gauge: Solar
	Wind gauge: Solar
Dimensions:	Base unit: 163 x 220 x 39 mm
Measurement range:	
	Indoor temperature: -40 °C to +59.9 °C
	Outdoor temperature: -40 °C to +59.9 °C
	Air pressure: 920 to 1,080 mbar
	Indoor air humidity: 1% to 99% rel. humidity
	Outdoor air humidity: 1% to 99% rel. humidity
	Wind speed: 0 bis 180 km/h
	Wind gust speed: 0 to 50 m/s
	Wind chill / dew point: -40 to +59.9 °C
	Rain quantity: 0 to 9,999 mm and mm/h
	Base unit: 163 x 220 x 39 mm
Resolution:	Temperature: 0.1 °C
	Air pressure: 1 mbar
	Air humidity: 1% rel. humidity
	Wind speed: 0.36 km/h
	Wind gust speed: 0.1 m/s
	Rainfall amount: 1 mm/h

ARTICLE NO.	
4210	**OPUS wireless weather station**
	Wireless weather station with thermo-hygro sensor, wind sensor with solar module, Rain sensor with solar module, PC software on CD (in German and English), USB transceiver
	ACCESSORIES
4211	Thermo-hygro sensor
4212	Water sensor
4214	Wind sensor

WEATHER STATIONS CHAPTER 11

ANALOGUE WEATHER STATIONS

Design outdoor weather station

Displays humidity, air pressure and air temperature. The "Design" version is made of stainless steel and features blue displays. It comes complete with installation materials for wall mounting

TECHNICAL SPECIFICATIONS:

Material:	Stainless steel
Dimensions:	96 x 35 x 282 mm
Base unit:	ø 70/70/70 mm
Weight:	340 g

ARTICLE NO.	
4213	**Stylish outdoor weather station**

Professional outdoor weather station

Displays humidity, air pressure and air temperature. Large stainless steel construction comes complete with installation materials for wall mounting.

TECHNICAL SPECIFICATIONS:

Material:	Stainless steel
Dimensions:	196 x 60 x 408 mm
Base unit:	ø 95/95/95 mm
Weight:	734 g

ARTICLE NO.	
4215	**Professional outdoor weather station**

Compact outdoor weather station

Displays humidity, air pressure and air temperature. The Compact version is made of aluminium/plastic and features a glass cover for wall mounting.

TECHNICAL SPECIFICATIONS:

Material:	Aluminium, plastic, glass
Dimensions:	146 x 70 x 216 mm
Weight:	461 g

ARTICLE NO.	
4227	**Compact outdoor weather station**

WIRELESS WEATHER STATION

Intelligent wireless weather station with forecasting index

Weather forecast system in text form with forecasting index, adjustable outdoor temperature alarm

Wireless weather station with up to three wireless transmitter for sending temperature and air humidity up to 100 m. Innovative text-based forecast system includes forecast index for fog, snow, glazed frost, thunder, storm, forecast of the lowest nightly temperature, duration and probability of forecast.

Displays the indoor temperature and humidity with comfort zone, maximum and minimum daily values with time and date saved (as text).

Symbols for current weather and forecast, tendency of atmospheric pressure, air pressure with display of air pressure for the last 12 hours, adjustable outdoor temperature alarm (channel 1), radio-controlled clock with date display.

TECHNICAL SPECIFICATIONS:

Power supply:	Base unit: three 1.5-V AA batteries Sensors: two 1.5-V AA batteries
Dimensions and weight:	Base unit: 175 x 120 x 30 mm, 660 g Sensors: 160 x 43 x 28 mm
Display ranges:	Indoor temperature: -10 °C to +60 °C Outdoor temperature: -40 °C to +60 °C
Air humidity:	1 to 99% rel. humidity
Resolution:	Temperature: 0.1 °C
Air humidity:	0.1 % rel. humidity

ARTICLE NO.	
4222	**Intelligent wireless weather station with forecasting index**
	Wireless weather station with a remote transmitter unit for temperature and humidity
4223	**Wireless radio transmitter sends temperature and humidity individually**

Wireless weather station with plant monitor

Intelligent weather station with indoor/outdoor temperatures, soil temperature and soil moisture

Intelligent weather station with indoor/outdoor temperatures, soil temperature and soil moisture. Flow icons and graphics are used to indicate the humidity. A total of five sensors can be connected. Extra time and alarm function.

Features:

- Weather (sunny, slightly cloudy, cloudy, rain and storm)
- Indoor/outdoor air temperatures
- Soil temperature
- Soil moisture displayed with flower icons and graphics
- Clock and alarm functions
- Battery indicator

TECHNICAL SPECIFICATIONS:

Power supply:	for base unit: two1.5V AA batteries, for sensor: one CR2450 battery
Operating temperature:	0 to 50 °C
Channels:	max. 5 channels
Soil moisture levels:	1 (dry) to 4 (wet) 1 to 99% rel. humidity
RF frequency:	433 MHz
Dimensions:	Base unit: 91 x 128 x 28 mm

ARTICLE NO.	
4230	**Wireless weather station with plant monitor**
	Wireless weather station with a soil sensor
4231	**Soil sensor**
	Soil temperature and soil moisture

Wireless weather station with frost warning function

4221

4255

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. Wireless (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 ranges:	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

ARTICLE NO.	
4221	**Wireless weather station with frost warning function**
	Wireless weather station with a radio transmitter unit for temperature
4255	**Wireless transmitter for temperature**

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 2,000 lx / 20,000 lx / 50,000 lx
Resolution:	1 lx, 10 lx, 100 lx
Precision:	± 5% +2 Digits
Display:	Liquid crystal display
Measuring rate:	0.4 seconds
Output voltage of sensor:	0.1 mV per 10 lx
Moisture range:	max. 80 % rel. humidity
Power supply:	One 12-volt battery, size A23
Run time:	approx. 200 hours
Dimensions and weight:	188 x 64.5 x 24.5 mm, 160 g

ARTICLE NO.	
4050	**Lux-Meter** with pouch and Light Guidebook
4077	**Light Guidebook**

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 2,000 lx / 20,000 lx / 100,000 lx
Resolution:	1 lx, 10 lx, 100 lx
Precision:	± 5% +2 Digits
Display:	Liquid crystal 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

ARTICLE NO.	
4054	**Lux-Multi** with Light Guidebook
4077	**Light Guidebook**

Lux-Mega

The Lux-Mega is a high-precision digital light meter that features five different measuring ranges. It can measure four different types of light: sun light, fluorescent lamp light, sodium-vapour lamp light and mercury-vapour lamp light. The meter also features a min/max/average display, a hold function, an RS232 interface and a zero-calibration function.

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 40 lx / 400 lx / 4,000 lx / 40,000 lx / 400,000 lx
Resolution:	0.01 lx / 0.1 lx / 1 lx / 10 lx / 100 lx
Precision:	± (3% +5% MBE); < 100,000 lx
Display:	Liquid crystal display
Humidity range:	max. 80%
Operating temperature:	0 to +50 °C
Power supply:	One 9-volt, 006P, MN1604 (PP3)
Dimensions and weight:	200 x 68 x 30 mm, 220 g

ARTICLE NO.	
4080	**Lux-Mega** with Light Guidebook
4077	**Light Guidebook**

MEASURING THE ILLUMINATION STRENGTH

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 – 2,000 µmol/m²s (for λ: 400 – 700 nm)
Display:	Liquid crystal display
Operating temperature:	0 to +50 °C
Output voltage:	0.1 mV per 10 lx
Power supply:	One nine-volt battery, size 6LR61
Run time:	approx. 200 hours
Dimensions and weight:	150 x 75 x 25 mm, 130 g

ARTICLE NO.	
4055	**Lux-Quantum meter** with Light Guidebook
4077	**Light Guidebook**

PAR light collector

The DLI 100 Par light collector measures photosynthetically active radiation in the wavelength range of 400–700 nm (PAR) in µmol/m². It displays this measurement as photosynthetically active photon flux density in µmol/m²/s. It records all photosynthetically active radiation over a period of 24 hours (the daily light integral: DLI) in mol/m²/d. The DLI 100 has an LED display for displaying (PAR and DLI)

TECHNICAL SPECIFICATIONS:

Measurement range:	PAR: 0 – 1500 µmol/m2/s (for λ= 400 – 700 nm) DLI: 0 – 30 mol/m2/d (for λ = 400 – 700 nm)
Display:	4 LEDs
Measurement interval:	PAR: 20 s; DLI: 24 h
Power supply:	3-V battery
Dimensions and weight:	60 x 190 mm, 150 g

ARTICLE NO.	
4087	**Light collector** with Light Guidebook

WIND GAUGE

Skywatch

Manual wind gauge

For measuring the current wind speed, maximum and average values, temperature display and perceived temperature (wind chill). Selectable units for wind speed: either km/h, mph, m/s, fps or knots. Temperature in °C or °F. Water-proof, with neoprene neoprene case and neck strap.

TECHNICAL SPECIFICATIONS:

Measurement range:	Wind speed: 0.7 to 108 km/h Temperature: -30 to +60 °C
Resolution:	Wind speed: 0.1 km/h Temperature: 0.1 °C
Precision:	± 5% or ± the value of the smallest displayed decimal
Dimensions and weight:	50 x 18 x 137 mm, 75 g

ARTICLE NO.	
4240	**Wind gauge**

MEASURING RAIN AND WIND WITH EVENT REPORTING

Snow, rain and wind warnings

The EMS event reporting system (refer to page 47) can be used to easily design precipitation and wind warning systems. An SMS or e-mail alert can then be sent as a warning after an event occurs. There is also a solar power option for completing an installation on-site if there is a power outage.

Precipitation warner
Consisting of the EMS232 event reporting system and an opto-electronic precipitation sensor. This system can be used, for example, to detect the onset of snowfall in winter.

Wind warning
Combination of event reporting system with a wind speed sensor and/or a wind direction indicator.

Refer to page 47 for the event reporting system.

TECHNICAL SPECIFICATIONS:

	Snow warner
Measurement technique:	Capacitive
Measured value:	Precipitation yes/no
Sensor area:	18 cm², heated
Sensitivity:	approx. 0.2 mm/h
Operating temperature:	-30 to +60 °C
Protection degree:	IP66 (DIN 40050)
	Rain warner
Measurement technique:	Opto-electronic
Measured value:	Precipitation yes/no
Sensor area:	25 cm², heated
Droplet size:	> 0.2 mm
Operating temperature:	-30 to +60 °C
Protection degree:	IP65 (DIN 40050)
	Wind warner
Measurement technique:	Cup anemometer
Measured value:	0.5 – 50 m/s
Precision:	±3% meas. value or ±0.5 m/s
Operating temperature:	-40 to +70 °C
Protection degree:	IP55 (DIN 40050)

ARTICLE NO.	
	Snow warning system, consisting of:
4900	**Event reporting system**
4712	**Capacitive precipitation monitor**
	Rain warning system, consisting of:
4900	**Event reporting system**
4705	**Opto-electronic precipitation monitor**
	Wind warning system, consisting of:
4900	**Event reporting system**
4708	**Wind speed sensor**
	ACCESSORIES
4921	Solar power supply

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.

ARTICLE NO.	
4110	**Prof. Hellmann rain gauge**
	ACCESSORIES
4150	Graduated cylinder insert

Wireless rain and temperature monitor

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 9,999 mm
Indoor temperature:	-10 to +50 °C
Outdoor temperature:	-50 to +70 °C
Power supply:	Three or two 1.5-V AA batteries
Dimensions and weight:	122 x 94 x 25 mm
ø x h: 132 x 160 mm, 630 g	

ARTICLE NO.	
4190	**Wireless rain monitor**

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.

ARTICLE NO.	
4011	**Rain gauge with pole fitting**
4203	**Rain gauge with rotating ring**
4204	**Rain gauge with basket**

BWK 2000

NEW

Soil-water inspection

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.
There is an LCD for the display. The device is easy to calibrate.

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

ARTICLE NO.	
9000	**BWK 2000**
	Aluminium housing, stainless steel probe with markings

FRUIT ANALYSIS CHAPTER 14

SOIL MEASUREMENTS

TDR 300

NEW

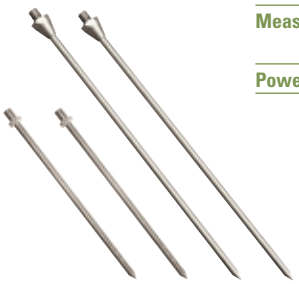
TDR 300 soil moisture meter

The TDR 300 is a measuring instrument for determining the moisture content in soil based on the TDR (time domain reflectometry) method.

This meter has an integrated data logger and can be fitted with an optional GPS module. This allows custom maps to be created that map the geographical coordinates of the soil moisture results. The TDR 300 comes delivered with a case.

TECHNICAL SPECIFICATIONS:

Measuring range:	volumetric soil moisture: 0 to approx. 50 vol.%
Resolution:	0.1 vol.%
Precision:	±3 vol.%
Useful probe length:	3.8, 7.5, 12 or 20 cm
Probe diameter:	0.5 cm
Measurement storage:	1,350 / 3,500 values with/without GPS
Power supply:	Four 1.5-V AAA batteries



ARTICLE NO.	
5093	**TDR 300**
	ACCESSORIES
5095	Probe pair, 3.8 cm
5096	Probe pair, 7.5 cm
5097	Probe pair, 12 cm
5089	Probe pair, 20 cm
	In delivery: The TDR 300 with matching carrying case; please order the pair of probes separately

TEL ++49(0)36601/93490 6 FAX ++49(0)36601/934907 WWW.STELZNER.DE

SOIL MEASUREMENTS

TDR 100

TDR soil moisture meter

TDR 100 is a measuring instrument for determining the moisture content in soil based on the TDR (time domain reflectometry) method. This meter is designed for on-the-go usage; it makes on-site measurements quickly and accurately. The TDR 100 comes delivered with a case.

The soil moisture sensor is waterproof and resistant to corrosion. It can be used for crop cultures as well as in natural soil.

TECHNICAL SPECIFICATIONS:

Measurement range:	volumetric soil moisture: 0 to approx. 50 vol.%
Resolution:	0.1 vol.%
Precision:	± 3 vol.%
Useful probe length:	3.8, 7.5, 12 or 20 cm
Probe diameter:	0.5 cm
Measurement storage:	1,350 / 3,500 values with/without GPS
Power supply:	Four 1.5-V AAA batteries

ARTICLE NO.	
5094	**TDR100**
	ACCESSORIES
5095	Probe pair, 3.8 cm
5096	Probe pair, 7.5 cm
5097	Probe pair, 12 cm
5089	Probe pair, 20 cm

In delivery: The TDR 100 with matching carrying case; please order the pair of probes separately

FRUIT ANALYSIS CHAPTER 14

SOIL MEASUREMENTS

SM150 soil moisture sensor

Measuring the volumetric soil moisture

The SM150 soil moisture sensor determines the volumetric soil moisture (m^3 water/m^3 of soil = vol. %). It operates based on the FDR (frequency domain reflectometer) principle. An electromagnetic field of 100 MHz is generated by the transmitting rod in the probe. The permeability of the soil field is then measured by the receiving rod. The permeability depends on the water content of the soil, the soil type and the amount of entrapped air. A measure of the permeability of this electromagnetic field is the relative permittivity. Since the relative permittivity of water is much greater than that of soil or air, the measurable change in the electromagnetic field is determined mainly by the soil moisture.
This type of measurement has a very low sensitivity to the salt content (salinity), temperature, and soil type. For more accurate measurements, it is possible to distinguish between mineral (sand, loam, or clay) soils and organic soils.
Measurements from the SSM 150 soil moisture sensor can be displayed using the HH150 portable analysis unit.
Data from multiple SSM 150 sensors can be recorded using the GP1 data logger and then imported to a PC. A maximum distance of 100 metres between the sensor and the data logger is possible.
Irrigation can be controlled by taking advantage of the programmable relay output.

TECHNICAL SPECIFICATIONS:

Measurement range:	Soil moisture: 0 to 70 %
Resolution:	0.1%
Precision:	±3.0%
Salt error:	± 5% in the range of 1 to 10 mS/cm
Operating temperature:	-20 to +60 °C
Sample volume:	ø min. 70 mm, depth min. 55 mm
Power supply:	Two 1.5-V AAA batteries
Dimensions and weight of the SM150:	ø: 40 mm, length: 143 mm, 0.1 kg

ARTICLE NO.	
8049	**HH150 KIT**
	Measurement kit for determining the volumetric soil moisture – consisting of the HH150 display unit (no storage memory), the SM150 probe and the portable case.
	ACCESSORIES
8042	**SM150 soil moisture sensor**
	for connecting to the HH150
8039	**Tube extension, 100 cm**
8038	**Tube extension, 50 cm**
8048	**GP1 data logger**
8051	**Connecting cable, 5 m**
	Additional accessories are available on request.

SOIL MEASUREMENTS

Tensiometer

8060

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.

This 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.

It is possible to connect to the EMS 323 event reporting system (page 47) by using the Tensio Trans transmitter or the Tensio Swith transmitter.

ARTICLE 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
8080	Tensio Trans transmitter
8085	Tensio Swith transmitter
	Irrigation control
	Consisting of the EMS 232 event reporting system (article no. 4900), and the tensiometer (article no. 8061) or the VH 400 soil sensor (article no. 8096).
4900	**Event reporting system**
8096	**VH 400 soil sensor**

SOIL MEASUREMENTS

VG 200 soil moisture meter

ARTICLE NO.	
8040	**VG 200 soil moisture meter**

Meter for determining the volumetric soil moisture, brightness and temperature, with soil sensor and 1-metre attached cable

The VG 200 is an affordable soil moisture meter for professional use.

It can measure volumetric soil moisture (in vol.%), ambient temperature and % brightness (related to full sun 100% and darkness 0%).
The temperature sensor can be calibrated by the customer for improved accuracy. A clock displays the current time.

The soil moisture sensor is waterproof and resistant to corrosion. It can be used for crop cultures as well as in natural soil.

TECHNICAL SPECIFICATIONS:

Measurement range:	Soil moisture: 0 to 70% Brightness: 0 to 100 % Temperature: -20 to +85 °C
Resolution:	Soil moisture: 1% Brightness: 1% Temperature: 1 °C
Operating temperature:	-20 to 85 °C
Useful probe length:	94 mm
Cable length:	1 m
Power supply:	Two 1.5-V AAA batteries
Dimensions of device:	25 x 65 x 95 mm

FRUIT ANALYSIS CHAPTER 14

IRRIGATION CONTROL

SensorMatic10

8096

8095

8095

ARTICLE NO.	
8095	**Sensormatic10**
8096	**VH400 soil sensor**

Additional configurations and options available on request

Sensor-controlled switching module with a single-channel timing relay: for irrigation control with soil moisture sensors as a start timer

The SensorMatic 10 is designed as a stand-alone unit for complex irrigation control applications, interior landscaping, and small installations in professional outdoor or greenhouse gardening.

A special feature is their variable configuration: they can be fitted with sensor for analogue or switching signals. They can also be operated with mains voltage or batteries, and with a switching output for various solenoid valves.
All settings are made with mechanical switches (without the PC). A custom configuration can be carried out for each desired application.

Configuration:

Watering interval in 15 steps (1 – 30 min + ∞);
15 switching thresholds as moisture levels for the sensors (valid for both sensors) corresponding to the respective sensor characteristics and the relevant humidity range for the typical application; rotary switch for configuring.

Programs for switching on and off:

Fixed time:	sensor switches on, Set time: switches off;
Max. time:	sensor switches on and off, after the set time (max. time) at the latest;
Pulse:	irrigation is divided into several cycles (set time + same time as pause) until the sensor finishes;

Setting the slide switch. Besides these programs, there is a manual switch (button) and a switchable blocking time.

TECHNICAL SPECIFICATIONS:

Power supply:	9 – 12 VDC (battery or external power supply)
Sensor input:	Max. 3 of type VH 400
Switching output:	1
Display:	LED
Dimensions:	130 x 130 x 97 mm

IRRIGATION CONTROL

Psychrometer according to Fleischmann

NEW

Photography: © Kruwt - Fotolia.com

For determining the saturation content of air with water vapour in%. Mathematical determination with the psychrometer table, according to Prof. Dr. Fleischmann's method using the evaporation difference between wet and dry thermometers.

TECHNICAL SPECIFICATIONS:

Measurement range of thermometer:	-10 to +50 °C
Resolution:	0.2 °C
Dimensions:	450 x 100 mm

ARTICLE NO.	
9160	**Psychrometer**

FRUIT ANALYSIS CHAPTER 14

MEASUREMENTS IN BULK SOLIDS

Grain moisture meter

The grain moisture meter is a portable meter that quickly measures the moisture content of grain, corn, oilseeds, protein crops and other crops (a total of 41 plants). The determination and its ramifications for the harvest are made directly in the field. The grain moisture meter has a whole-grain measurement technique and a practical handling interface so that it is able to deliver multiple measurements in seconds without any cleaning required.
The large display and simplicity of the meter's operation allow you to use all functions even in the dark. Since you can now determine moisture in the field, trips to your dealer and expensive waiting times are no longer necessary.

TECHNICAL SPECIFICATIONS:

Measurement range:	5 to 40 % (depending on crop)
Precision:	± 0.5 %
Resolution:	0.1 %
Temperature compensation:	Automatic
Sample quantity:	80 ml
Measurement curves:	for 41 crop types
Power supply:	Two nine-volt battery, size 6LR61
Dimensions and weight:	100 x 175 x 75 mm

ARTICLE NO.	
9120	**Grain moisture meter**
	Meter with carrying case

Hay/straw moisture meter

The hay/straw moisture meter is used to determine the moisture content and temperature of pressed hay or straw. It features a continuous stainless steel probe and an ergonomically shaped wooden handle. This meter is extremely robust and designed for long-term real-world usage.
The display continuously shows the current humidity level. In just a few seconds, you can measure at different locations within the bale or in many bales without pressing any button. The moisture meter enables you to ensure the quality of your feed at the time of harvesting or drying. This helps you to avoid damage from fungal decay and rotting.

TECHNICAL SPECIFICATIONS:

Measurement range:	Temperature: -10 to 100 °C Moisture: 9 to 50 %
Precision:	±0.8% in the lower humidity range
Resolution:	0.1 %
Material:	Measuring lance and probe tip are made of stainless steel
Usable length of the lance:	25/50/100/270 cm
Power supply:	One nine-volt battery, size 6LR61
Weight:	1.5 kg

ARTICLE NO.	
9110	**Hay/straw moisture meter**
	Meter with cap, lengths: 25/35/50/100/270 cm, please specify when ordering

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

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

AMBIENT MEASUREMENTS

Hygrometer with indoor/outdoor thermometers

Measures air humidity and temperature

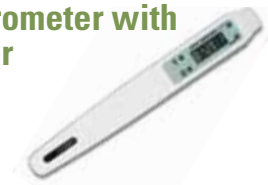
Wall hygrometer with indoor/outdoor thermometers and minimum/maximum feature. All values can be displayed at the press of a button. The external temperature sensor is about 3 metres long. The display can switch between °C and °F.

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-V AA battery

ARTICLE NO.	
4025	**Hygrometer with indoor/outdoor thermometers**

Pocket hygrometer with thermometer



Measuring air humidity and temperature

Pocket-sized meter for measuring 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

ARTICLE NO.	
4027	**Pocket hygrometer with thermometer**

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.

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

ARTICLE NO.	
4033	**High-precision hair hygrometer**

FRUIT ANALYSIS CHAPTER 14

MEASUREMENTS ON SOLID OBJECTS

Wood moisture meter

The Bio Moisture Wood

The moisture content of wood can fluctuate significantly. The conventional method using electrodes on the wood surface is not particularly accurate, since contact is made only to the outside of the trunk or wood block.
The Bio Moisture Wood has been designed to provide more accurate results. With this method, an incision is made in the piece of wood with a chainsaw; the measurement is then carried out on the pieces obtained. Thus, the sample runs through the whole wood and is much more accurate.
This method is also suitable for measurements of pallets, wood pellets and sawdust.

TECHNICAL SPECIFICATIONS:

Areas of use:	Chainsaw chips/saw dust
15 to 65%,	
Wood pellets	4 to 23%,
Ordinary sawdust	6 to 30%

ARTICLE NO.		
9130	**The Bio Moisture Wood**	
	Meter, collection bucket, carrying case	

Moisture meter for wood chips

The Bio Moisture

This moisture meter for wood chips measures the moisture content of various types of wood chips normally used as solid fuels in power plants. This meter can measure common wood chips of various sizes, ranging from coarse wood chips to fine drill residue.
The moisture content of the wood chips can be measured directly at the stockpile or at the loading zone. Material samples can also be collected and measured in a bucket.

TECHNICAL SPECIFICATIONS:

Areas of use:	Measuring range
Wood chips: 12 to 40%,	
Drill residue	30 to 70%
Features:	The method for determining the moisture content corresponds to the technical specifications in CEN/TS 14774-1:2004 (used in the European Union).

ARTICLE NO.		
9135	**The Bio Moisture**	
	Meter, dish probe, carrying case	

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

ARTICLE NO.		
9150	**Material moisture meter**	
	with bag and mounting clip	

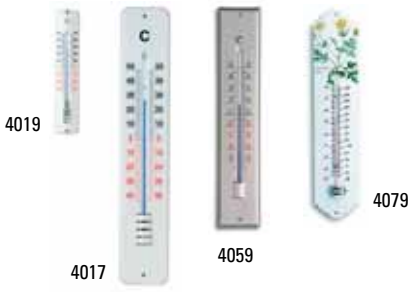
ANALOGUE THERMOMETER

Min/max thermometer

Min/max thermometer with easy-to-read scale, in aluminium or plastic. Measurement range: -38 to 50°C. Contains no mercury.

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

Gardener thermometer



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

ARTICLE NO.	
4019	**Gardener thermometer**
	205 mm x 40 mm, 60 g, white
4059	**Gardener thermometer**
	280 mm x 58 mm, 150 g, silver
4017	**Gardener thermometer**
	450 mm x 80 mm, 130 g, white
4079	**Enamel thermometer**
	Up to 65°, 290 mm x 63 mm, 170 g, floral

Insertion thermometer

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

Refer to page 60 for printing details.

TECHNICAL SPECIFICATIONS:

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

ARTICLE NO.	
4225	**Insertion thermometer**

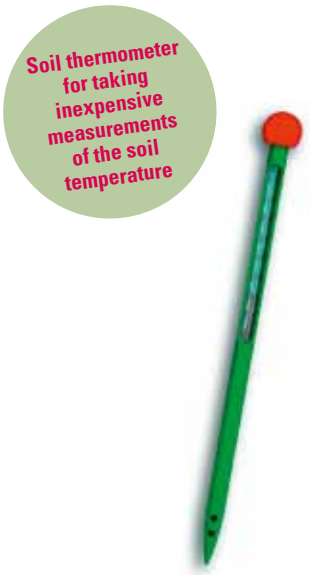
TEMPERATURE MEASURING SYSTEMS CHAPTER 15

ANALOGUE THERMOMETER

Plastic thermometer

ARTICLE NO.	
4083	**Plastic thermometer**
	26 x 9 x180 mm, 12 g, -30 to +50°, white
4084	**Cooler thermometer**
	ø 13 mm x 45 mm, 10 g, -30 to +30°

Plastic soil thermometer



ARTICLE NO.	
4086	**Soil thermometer**
	29 x 22 x 322 mm, 63 g, -5 to +80°

Frost monitor

Contact thermometer

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 2,000 metres can be obtained when using LiYCY cables (2 x 0.5 mm²) or PVC control cables.

ARTICLE NO.	
4082	**Fixed-contact thermometer** (Please specify temperature when ordering)

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 ranges or lengths (up to 4 m) available on request.

TECHNICAL SPECIFICATIONS:

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

ARTICLE NO.	
4051	**Compost thermometer: 0.5 m** 0 to 120°C
4006	**Compost thermometer: 1.0 m** 0 to 120°C
4007	**Compost thermometer: 1.5 m** 0 to 120°C
4078	**Compost thermometer: 2.0 m** 0 to 120°C
4081	**Compost thermometer: 2.5 m** 0 to 120°C
4260	**Calibration certificate** Measurement at three points

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 (6 mm diameter) and display (50 mm diameter).

Other measurement ranges and lengths are available on request.

TECHNICAL SPECIFICATIONS:

	Soil thermometer
Measurement range:	–20 to +60°C
Display:	ø 50 mm
Measuring rod:	ø 6 mm
Material:	Stainless steel measuring rod Measuring head made from glass and steel
	Vapour thermometer
Measurement range:	0 to +120 °C
Display:	ø 50 mm
Measuring rod:	ø 6 mm
Material:	Stainless steel measuring rod Measuring head made from glass and steel

ARTICLE NO.	
4001	**Soil thermometer: 200 mm** **–20 to 60°C**
4002	**Soil thermometer: 300 mm** -20 to 60°C
4004	**Soil 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

Stainless steel thermometer

Bi-metal stainless steel thermometer with large display

High-precision bi-metal stainless steel 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 (6 mm diameter) and display (63 mm diameter).

Other measurement ranges and lengths are available on request.

TECHNICAL SPECIFICATIONS:

	Soil thermometer
Measurement range:	–20 to +60°C
Precision:	Class 1 (1%)
Display:	ø 63 mm
Measuring rod:	ø 6 mm
Material:	Stainless steel measuring rod Measuring head made from glass and stainless steel
	Vapour thermometer
Measurement range:	0 to +120 °C
Precision:	Class 1 (1%)
Display:	ø 63 mm
Measuring rod:	ø 6 mm
Material:	Stainless steel measuring rod Measuring head made from glass and stainless steel

ARTICLE NO.	
4206	**Soil thermometer: 300 mm** -20 to 60°C
4208	**Soil thermometer: 500 mm** -20 to 60°C
4242	Vapour thermometer: 300 mm 0 to +120°C
4243	Vapour thermometer: 500 mm 0 to +120°C
4260	**Calibration certificate** Measurement at three points

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 metres 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-V AA battery

ARTICLE NO.	
4022	**Min/max thermometer** with indoor and outdoor thermometers

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:

Measuring range:	- 40 to + 200 ° C
Resolution:	0.1 °C
Precision:	± 1 °C
Protection degree:	IP65
Dimensions and weight:	95 x 60 x 18 mm (without probe), 130 g

ARTICLE NO.	
4024	**Digital thermometer with insertion probe**

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-V AA battery, size "393"
Dimensions and weight:	195 x 20 mm, 24 g

ARTICLE NO.	
4058	**Quick digital thermometer**

TEMPERATURE MEASURING SYSTEMS CHAPTER 15

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 for 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 (for 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

ARTICLE NO.	
4286	**Miniflash**

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 +1,400 °C
Resolution:	0.1 °C (1 °C at over +200 °C)
Precision:	Infrared: ±2 °C or ±2 % *
	Thermocouple: ±1 °C or ±1 % *
	(* the larger of the two values is valid)
Emissions ratio:	0.10 to 1.00, adjustable
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

ARTICLE NO.	
4285	**Laser thermometer**

Wireless thermometer

4250

4255

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

ARTICLE NO.	
4250	**Wireless thermometer with transmitter**
4255	**Wireless transmitter for temperature**

DIGITAL THERMOMETER

Temperature probe with digital display

NEW
Length: 40cm

This temperature probe allows you to monitor the temperature curve in your warehouse. So, when necessary, you can intervene promptly and prevent losses caused by insects and fungi. The lance and the handle are made of stainless steel. The temperature sensor, display and the wiring are in the stainless steel tube. It is versatile and can be used at temperatures up to 110 °C. The temperature probe can be used for monitoring temperatures in hay, straw, grain, wood chips, compost and other bulk materials.

TECHNICAL SPECIFICATIONS:

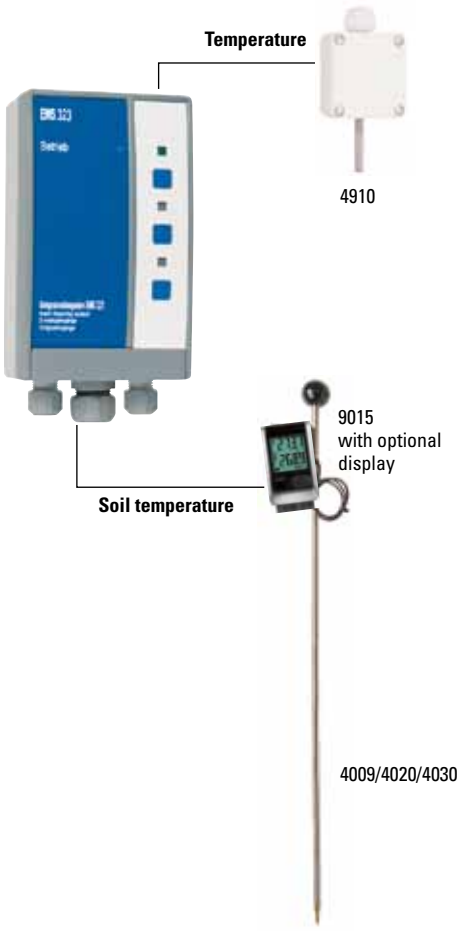
Measurement range:	-50 to +110 °C
Precision:	± 1 °C
Lance length:	0.4 m, 1.5 m or 2.8 m
Lance diameter:	16 mm
Material:	+5 to +40 °C
Display:	Liquid crystal display
Power supply:	One LR44
Weight:	1.95 kg

ARTICLE NO.	
4128	**Temperature probe 40 cm, with digital display**
4028	**Temperature probe 1.5m, with digital display**
4029	**Temperature probe 2.8m, with digital display**

TEMPERATURE MEASURING SYSTEMS CHAPTER 15

DIGITAL THERMOMETER WITH EVENT NOTIFICATION

Frost warner



The EMS event reporting system (refer to page 47) can be used to easily design ground frost and frost warning systems. An SMS or e-mail alert can then be sent as a warning after an event occurs. There is also a solar power option for completing an installation on-site if there is a power outage.

Ground frost warner
Consisting of the EMS 232 event reporting system and a soil temperature sensor.

Frost warner
Consisting of the EMS 232 event reporting system and an ambient temperature sensor.

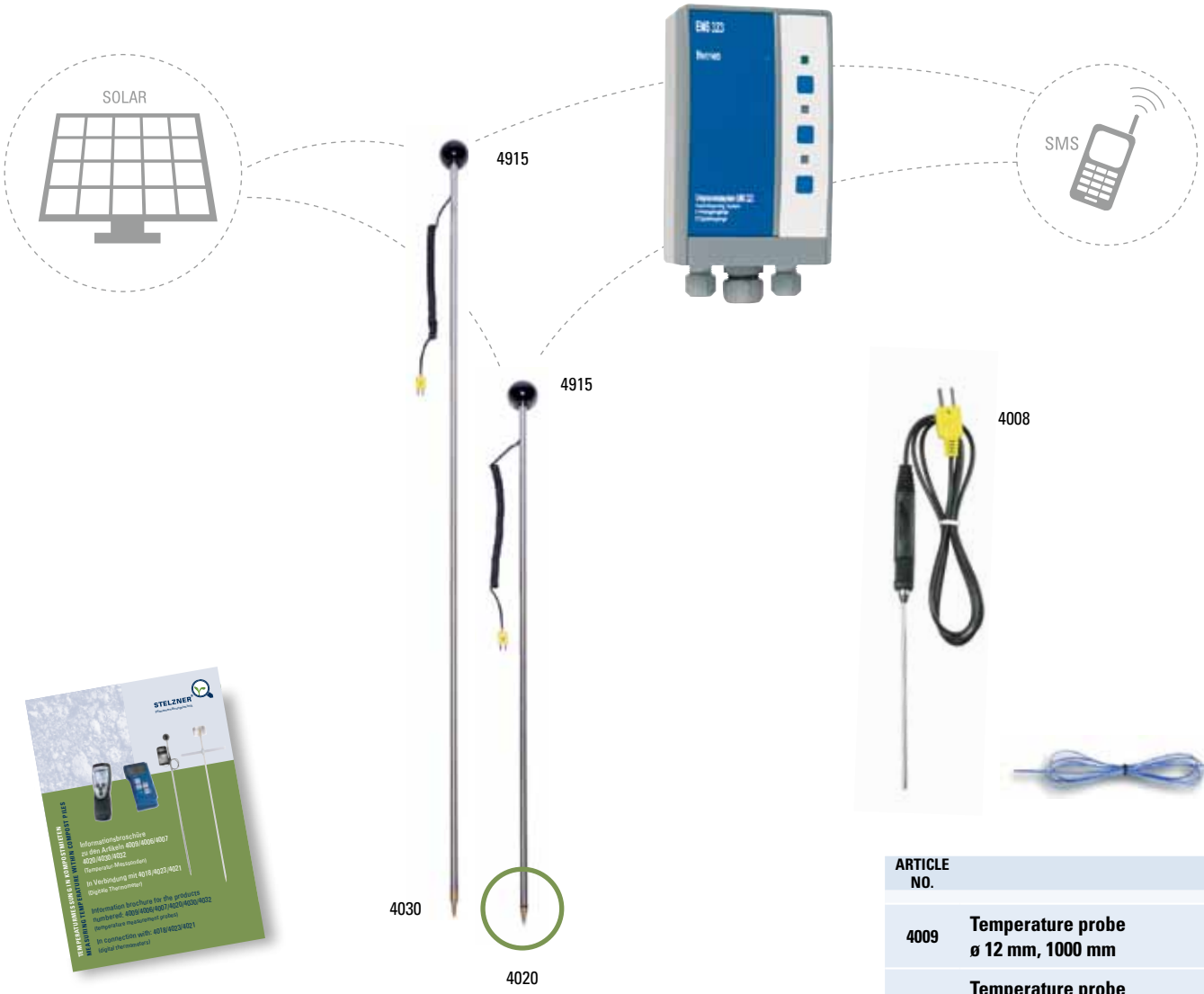
Refer to page 47 for the event reporting system.

TECHNICAL SPECIFICATIONS:

	Room temperature sensor
Measurement technique:	PT100
Measurement range:	-50 to +90 °C
Protection degree:	IP65
Dimensions:	64 x 58 x 34
	Soil temperature sensor
Measurement technique:	Thermocouple type K, class 1
Measurement range:	–20 to +105 °C
Probe lengths:	from 20 cm to max. 4 metres

ARTICLE NO.	
	Ground frost warning system, consisting of:
4900	**Event reporting system**
4009	**Temperature (1 metre)**
4915	**Temperature transmitter Type K, for connecting to the EMS**
	Frost warning system, consisting of:
4900	**Event reporting system**
4910	**Room temperature sensor**

Temperature probes



4020

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.

An optional connection to the EMS 323 event reporting system (page 47) for a temperature transmitter is also available.

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

ARTICLE 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**
4915	**Temperature transmitter Type K, for connecting to the EMS**

	ACCESSORIES
4026	Mounting clip for temperature probe
4900	Event reporting system
4921	Solar power supply

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DIGITAL THERMOMETER WITH EXTERNAL SENSORS

Digital thermometer

4018

4026

4009/4020/4030

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 +1,200 °C
Resolution:	1 °C
Precision:	±1% + 1 °C (0 to +750 °C)
Display:	Liquid crystal display
Power supply:	One nine-volt battery, size 6LR61
Dimensions and weight:	108 x 73 x 23 mm, 140 g

ARTICLE NO.	
4018	**Digital thermometer for two sensors.**
	ACCESSORIES
4026	Mounting clip for temperature probe

Digital thermometer with calibration certificate

4023

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 +1,370 °C
Resolution:	0.1 °C (for up to 399.9 °C), otherwise 1 °C
Precision:	±0.5 °C
Display:	Liquid crystal display
Power supply:	Two 1.5-V AA batteries
Run time:	approx. 200 hours
Dimensions and weight:	130 x 65 x 25 mm, 240 g

ARTICLE NO.	
4023	**Digital thermometer for precise measurements.**
	ACCESSORIES
4075	Software

Digital thermometer

Option available on request

4021

Digital thermometer with wireless option

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 +1,000 °C
Resolution:	0.1 °C (for up to 199.9 °C), otherwise 1 °C
Precision:	± (0.5 °C +0.3%)
Display:	two-character LCD display
Supply:	one 9-V AA battery, size 6F22
Run time:	approx. 200 hours
Dimensions and weight:	182 x 64 x 40 mm, 171 g

ARTICLE NO.	
4021	**Digital thermometer with wireless option.**
	ACCESSORIES
4034	**TOP-SAFE protects against dirt and impact**
	Wireless probe and log printer are available on request

Compact data logger

4330

4310

4311

4335

Compact data logger

Data logger for temperature (T1, T3 and T4) to reliably measure, save and document data. The 175/176 series of compact data loggers are used for measuring temperatures. They are capable of storing up to 2 million 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 USB and SD card interfaces, so readouts are quick and easy. This new series features the advantages of a significantly larger storage capacity and power from conventional batteries. Our proven one-button menu structure provides outstanding convenience for the operator and is also featured in the new data loggers. Typical usages include inexpensive temperature monitoring in greenhouses, refrigerated transport, refrigerated storage rooms, in display cases and 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 42, 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.

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 a plane, 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.

Simple data readouts and transfer to PC via a USB port

Software for the data logger

Windows software for the data logger: for data analysis and PC-based device reprogramming, with new GUI.

Convenient export functions for further processing in Excel or for generating a PDF. The software is delivered on a USB flash drive.

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
Measurement storage:	1 million readings
Measurement intervals:	adjustable 10 s to 24 h
Operating temperature:	-35 to +55 °C
Power supply:	Three AAA AlMn batteries
Run time:	approx. 3.0 years with a 15-min. measuring interval
Protection degree:	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 +1,000 °C
Resolution:	0.1 °C
Precision:	± 0.5 °C (-50 to +70 °C) ±0.7% (70.1 to +1,000 °C)
Measurement storage:	1 million readings
Measurement intervals:	adjustable 10 s to 24 h
Operating temperature:	-35 to +55 °C
Power supply:	Three AAA AlMn batteries
Run time:	approx. 3.0 years with a 15-min. measuring interval
Protection degree:	IP65
Dimensions:	89 x 53 x 27 mm

Four-channel temperature logger with 4 external probes (NiCr-Ni): Model 176-T4

Measurement range:	-195 to +1,000 °C
Resolution:	0.1 °C
Precision:	± 0.5% (+70.1 to +1,000 °C) ±1 digit ± 1% (-200 to -100.1 °C) ± 0.3 °C (-100 to +70 °C)
Measurement storage:	2 million readings
Measurement intervals:	1 s to 24 h
Operating temperature:	–20 to +70 °C
Power supply:	One 3.6-V AA battery
Service life:	8 years using a 15-minute measuring cycle
Protection degree:	IP54
Dimensions:	103 x 63 x 33 mm

Mini data logger

Measurement range:	-30 to +70 °C
Resolution:	0.1 °C
Precision:	±0.5 °C (-30 to +70 °C)
Measurement storage:	16,000 readings
Measurement intervals:	adjustable from 1 min to 24 hours
Operating temperature:	-30 to +70 °C
Power supply:	Two 3-volt button cell, size CR2032
Service life:	500 days (typical)
Protection degree:	IP65
Dimensions:	60 x 38 x 18.5 mm

ARTICLE NO.	
4330	**175-T1 data logger**
4310	**175-T3 data logger**
4311	**176-T4 data logger**
4335	**T174 mini data logger with wall mount**

	ACCESSORIES
4343	Replacement battery for 175-T1 (4330), -T2 (4309), 177 (4311) and 176 (4311-N)
4345	Replacement battery for the 175-H2 (4320), -T3 (4310)
4348	One 1.5 V battery, type AAA for 175 (4320-N), 175-T1 (4330) and 175-T3 (4310) (three should be ordered)
4333	Replacement battery for T174 Size CR2032
4323	Software on USB flash drive

DATA LOGGER FOR TEMPERATURE AND HUMIDITY

Industrial data logger

Wireless data loggers with 1-km transmission ranges as well as GPRS/GSM or WiFi systems are available for applications with demanding requirements

ARTICLE NO.	
4360	Wireless data logger
4380	GPRS/GSM or WiFi data logger

GPRS/GSM or WiFi data logger

The GPRS/GSM or WiFi data logger is a user-friendly, affordable monitoring system that can be connected to various instruments (meters, sensors or probes). They enable you to the load data in real time onto your server from remote locations. The monitoring system is a combination of hardware and software that consists of three main components:

– GPRS/GSM oder WiFi data logger: this is a stan dalone device that is connected to another instruments for measuring flow, temperature, pressure and humidity.
– Integrated communications technology for transmitting data (via global SIM card, GPRS or WiFi).
– A web server with data and application capa bilities (including two-way communications, alarm configuration, closing valves, etc.)

The GPRS/GSM or WiFi data logger is a comprehensive solution for continually monitoring and managing water, gas, electricity, environment, agriculture, M2M and energy usage.

Wireless data logger

The wireless data logging system has been designed for applications where wired data transfer is not possible. Thanks to their high-quality, energy-efficient 433 MHz transmission technology, these devices have ranges of more than one kilometre and a battery life of up to 12 years. Other benefits include:

– Long range: 2 to 5 floors within a building; in the open field up to 1.5 km. This range can be extended significantly by using repeaters.
– Extremely long battery life: up to 12 years using conventional batteries.
– Very low maintenance: because of long battery life and easy installation.
– Compatible with many automation systems: thus the installation is less complex and less expensive.
– The wireless system can be integrated with existing systems because of its simple configuration and plug-in software support

DATA LOGGER

Disposable data logger

Measuring temperature

The innovative TempMate disposable data logger has a built-in USB port. It is an ideal, affordable device for monitoring temperatures during the transportation of goods. This data logger is pre-configured to meet individual customer requirements and then delivered so that it can be used immediately. The TempMate can be connected directly to the USB port in order to evaluate the data. A PDF report is then generated automatically. This provides a temperature profile, all individual values and statistical information.

TECHNICAL SPECIFICATIONS:

Measurement range:	-30 °C to +70 °C
Precision:	±0.5 °C
Resolution:	0.1 °C
Measurement storage:	7,200 values
Recording time:	24 hours to 60 days
Measurement storage:	16,000 readings
Measurement interval:	10 s to 120 min
Service life:	approx. 1 year
Power supply:	3.0 V lithium battery
Dimensions:	80 x 47 x 4 mm
Weight:	10 g
Protection class:	IP67 / NEMA 6
System requirements:	PDF reader
Certification:	EN12830, Calibration Certificate, CE, RoHS

ARTICLE NO.	
4375	**Disposable data logger**

USB data logger

Measuring temperature and air humidity

The USB data logger records the temperature and air humidity in rooms. Using the supplied software, stored data can be easily evaluated on a PC. It can also be exported in various formats (eg. as text or Excel files). The software can also be used for calculating the dew point and for setting visual alarms. The data logger software also runs on Windows 7,

TECHNICAL SPECIFICATIONS:

Measurement range:	Temperature: -20 °C to +70 °C Air humidity: 0% to 100%
Precision:	Temperature: ±0.3 °C Air humidity: ± 0.3 °C
Resolution:	Temperature: 0.1 °C
Operating temperature:	-20 to +70 °C
Measurement interval:	adjustable 10 s to 12 h
Measurement storage:	16,000 readings
Communication:	USB interface
Service life:	approx. 3 years
Power supply:	3.6 V battery
Dimensions:	126 x 28 x 51 mm

ARTICLE NO.		
4370	**USB data logger**	Data logger, bracket for wall mounting, software, battery

MOISTURE DATA LOGGER

Data logger

Measures the relative ambient humidity

Moisture and temperature logger with internal sensor (refer also to page 40)

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% RH/K
Measurement storage:	1 million readings
Measurement intervals:	adjustable 10 s to 24 h
Operating temperature:	-20 °C to 55 °C
Power supply:	Three AAA AIMn batteries
Run time:	approx. 3.0 years with a 15-min. measuring interval
Dimensions:	149 x 53 x 27 mm

ARTICLE NO.	
4320	**175-H1 data logger**
4323	**Software on USB flash drive**

Wireless transmission system

Measures temperature, humidity and carbon dioxide

This line of wireless transmitters features state-of-the-art sensor technology with optimal data transfer security and very easy installation.
Whether you need a simple point-to-point connection or a complex network, this wireless transmitter system offers the ideal solution.

Wireless transmitter

Measurement functionality for temperature, humidity and CO_2 is built into the well-designed enclosure. An optional display is available for displaying data on-site. The transmitter is normally powered by standard batteries, but for power-hungry CO_2 applications, the device can also be powered externally.

Industrial wireless transmitter

The industrial housing can be equipped with up to three sensor slots for connecting the interchangeable measurement sensors. An optional display is available for displaying data on-site. Batteries are normally used for the power supply. The device can use an external power supply for applications that require more power.

Interchangeable sensors

A modular, easily expandable collection of sensors enables the device to be used for many different applications. Our time-tested, proven sensor technology for measuring relative humidity, temperature and CO_2 ensures accurate measurements and outstanding long-term stability.
There is a standardized sensor interface and sensors are capable of storing calibration data. This allows you to select any combination of sensors to fit your application. Subsequent replacements or expansions of the sensors, or sensor replacements during servicing can thus be made in seconds. This is a key feature that enables comprehensive, gap-free data acquisition.

For high-temperature applications or applications where space is limited, the sensors can be connected using a pluggable cable up to 10 metres in length.

Base station

Do you need to cross a road? An affordable point-to-point connection can easily be established using the Mono version. The configuration (with max. four measured variables for transmitting) is carried out at the factory in accordance with your specifications. The measured variables are available as analogue values (0 – 5 / 10V or 0/4 – 20mA) immediately after the device is installed. The customizable Multi version is the best choice for complex networks (with up to 500 transmitters or up to 2,000 measured variables). Regardless of your network's topology, the embedded web server and the Ethernet port give you excellent flexibility while configuring your network on a PC. The measurement system can easily be integrated into the customer's network. In addition, there is a simple remote access/diagnostics feature for accessing the measured values. Values can be output in both analogue and digital format (over Ethernet). Modbus is supported for the interface to a bus system. The current measured values and various operating states can be displayed on an optional display.

Router

Wireless transmission distances are dependent on structural conditions. Routers can be used to overcome obstacles or to extend wireless ranges.

ARTICLE NO.	
4950	**Wireless transmission system**

TECHNICAL SPECIFICATIONS:

	Wireless transmitter
Measurement range:	Temperature: -5 to +55 °C Air humidity: 0 to 100 % rel. humidity Carbon dioxide 0 to 2,000 or 5,000 ppm
Precision:	Temperature: ± 0.3 °C (at 20 °C) ± 0.4 °C (20 – 55 °C) Humidity: ± 3% (30 – 70%) Carbon dioxide: 2,000 ppm (± 50 ppm +2% of meas. value) 5,000 ppm (± 50 ppm + 3% of meas. value)
Range:	up to 60 metres in buildings
Power supply:	Four 1.5V AA batteries or external 24 VAC (recommended for CO_2)
Service life:	one year when transmitting the readings every 5 minutes (for temp. and % rel. humidity)
Housing:	polycarbonate (PC)
Protection degree:	Housing: IP30
Measured variables:	max. three (temp /% rel.hum. /CO_2)

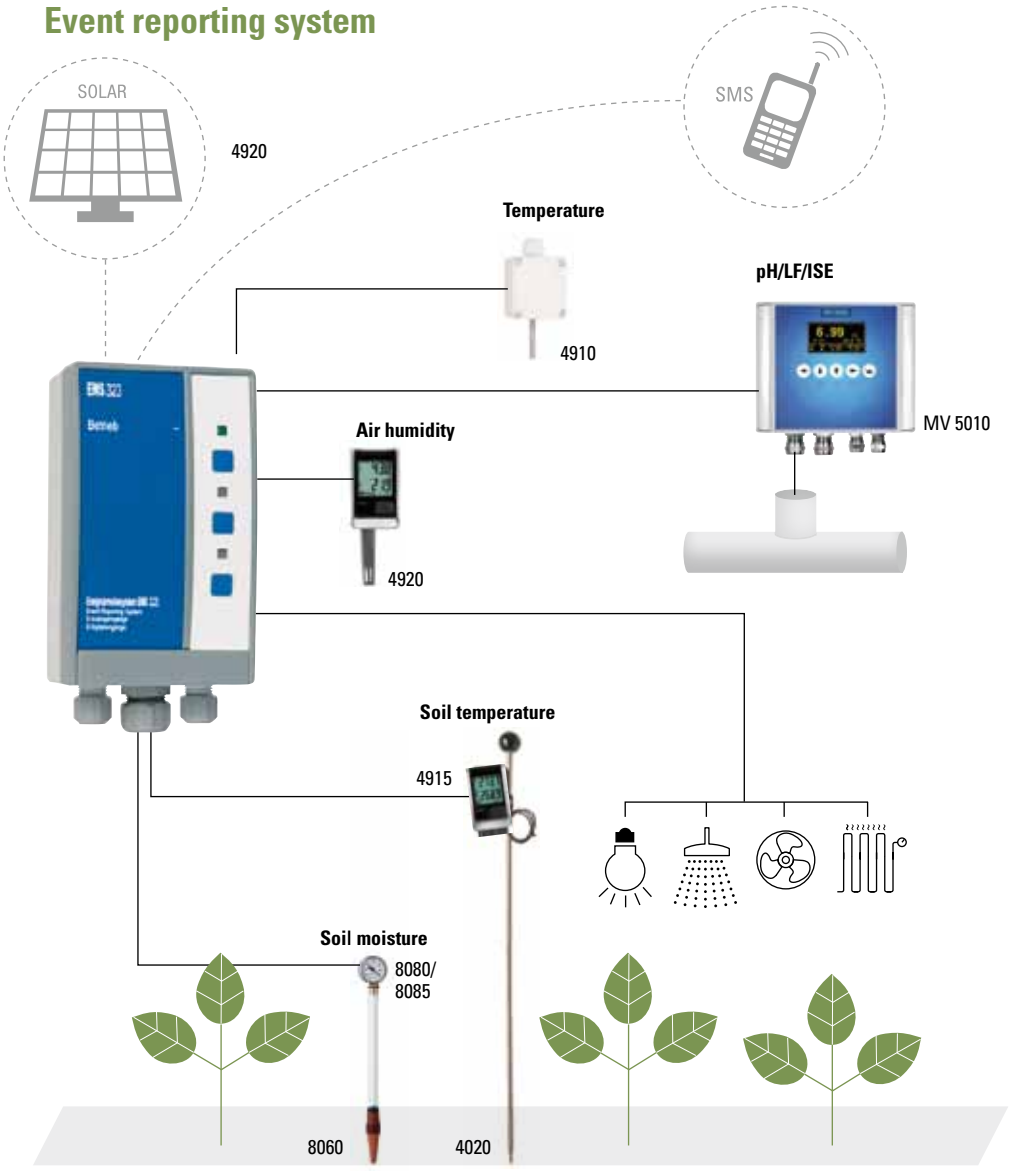
	Industrial transmitter / router, base unit
Probe:	max. three
Measured variables:	max. six
Range:	max. 100 m in buildings, up to 1,000 m in open field
Power supply:	Four 1.5V AA batteries or external 24 VAC
Service life:	> one year when transmitting the readings every 5 minutes (for temp. and % rel. humidity)
Housing:	polycarbonate (PC)
Protection degree:	Housing: IP65
Temperature sensors:	Measurement range: -40 to +80 °C Accuracy: ± 0.1 °C at 20 °C

Humidity / temperature sensor:	
	Measurement range: 0 to 100 % rel. humidity Accuracy: ±2% to 90% rel. humidity Meas. range: -40 to +80 °C Accuracy: ± 0.1 °C at 20 °C
Carbon dioxide:	Measurement range: 0 to 2,000 ppm, 5,000 ppm or 10,000 ppm
Precision:	0 to 2000 ppm < ± (50 ppm +2 % meas. value) 0 to 5,000 ppm: < ± (50 ppm +3 % meas. value) 0 to 10,000 ppm: < ± (100 ppm +5 % meas. value)

	Mono/Multi base station
Power supply:	24 VDC
Communication:	Ethernet, Modbus
Analogue outputs:	4 to 20 mA, max. four outputs
Housing:	polycarbonate (PC)
Protection degree:	Housing: IP20

PRODUCTION MONITORING VIA MOBILE PHONE

Event reporting system



EMS 323 event reporting system: production control using your mobile phone

The EMS 323 event reporting system is a remote monitoring system that can be used for monitoring and controlling your horticultural production sites. Up to three analogue signals (4 to 20 mA) and two digital signals (such as room temperature, air humidity, soil moisture, pH, EC, etc.) can be monitored with one device. If any of the measured values change or exceed the pre-defined min/max values, then a message is sent to the specified telephone, fax numbers or e-mail addresses.

Up to 12 phone numbers, 4 fax numbers or 4 e-mail addresses can be assigned and saved. The EMS 323's GSM quad-band functionality allows you to control and view the status of measuring devices and horticultural production facilities worldwide regardless of your location. The GSM M2M (machine-to-machine) technology enables SWITCHING, RECEIVING and MEASURING via SMS or telephone call.

The devices can be programmed using the supplied configuration software. All parameters (measurement intervals, limits, data transmission intervals, etc.) can easily be set over the integrated USB-A interface (e.g. using a laptop). The operator can also change parameters any time using a mobile phone. The EMS 323 requires a conventional, activated SIM card from any network provider.

TECHNICAL SPECIFICATIONS:

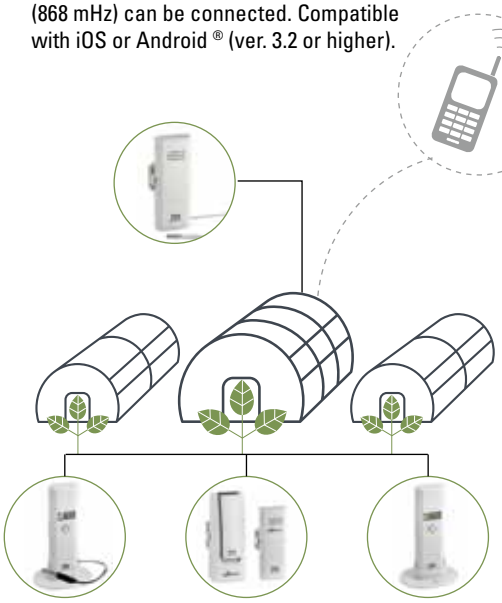
	Temperature range
Ambient surroundings:	**–20 to +60 °C**
Power supply:	230 VAC
Power supply for sensor:	24 VDC
Alarm inputs:	3 analogue inputs: 4 to 20 mA 2 digital inputs, connected potential-free
Data transfer:	GSM short message (SMS) with integrated GSM modem
Frequency ranges:	GSM quad-band 850/900/1,800/1,900 MHz
Switching outputs:	Relay contacts: 3 potential-free changeover contacts: 250 V AC, max. 5 A
Housing:	Wall-mounted housing made from impact-resistant plastic (ABS) W 100 x H 188 x D 65 mm
Protection degree:	IP40 (EN 60529)

ARTICLE NO.	
4900	**Event reporting system**
	ACCESSORIES
4910	Room temperature sensor
4920	Humidity sensor
4925	Humidity/temperature sensor
8080	Tensio Trans transmitter for connecting to Tensiometer (refer to p. 34)
8085	Tensio Swith transmitter for connecting to Tensiometer (refer to p. 34)
4915	Temperature transmitter for connecting to soil/temperature probe (refer to p. 39)
4916	LF transmitter for connecting to conductivity electrode
4917	pH transmitter for connecting to pH probe
4712	Capacitive precipitation monitor
4705	Opto-electronic precipitation monitor
4708	Wind speed sensor
4921	Solar power supply
	Others available on request

WEATHERHUB SYSTEM

Using a smart phone as a mobile climate controller

Climatic data can be controlled any time and place by taking advantage of various sensors. Data from the past 90 days can be retrieved worldwide from multiple users. The free app is easy to use. Alarm limits with push notifications can be set for alarm scenarios. Installation via an internet gateway. Up to 50 sensors (868 mHz) can be connected. Compatible with iOS or Android ® (ver. 3.2 or higher).



WeatherHub starter set

NEW

Gateway and transmitter with temperature sensor for indoors

TECHNICAL SPECIFICATIONS:

Measurement range:	-30 to +60 °C
Range in open field:	approx. 100 m
Power supply:	Two 1.5 V type AAA batteries

ARTICLE NO.	
4266	**WeatherHub starter set**

WeatherHub external temperature

NEW

Transmitter with external, waterproof temperature sensor (one metre length)

TECHNICAL SPECIFICATIONS:

Measurement range:	-30 to +60 °C
Range in open field:	approx. 100 m
Power supply:	Two 1.5 V type AAA batteries

ARTICLE NO.	
4267	**WeatherHub external temperature**

SMART PHONE SYSTEMS CHAPTER 18

WEATHERHUB SYSTEM

WeatherHub temperature/humidity

NEW

Transmitter with integrated temperature and humidity sensor for indoor use

TECHNICAL SPECIFICATIONS:

Measurement range:	Temperature: -40 to +60 °C
Air humidity: 0 to 99 % rel. humidity	
Range in open field:	approx. 200 m
Power supply:	Two 1.5 V type AAA batteries

ARTICLE NO.	
4268	**WeatherHub temperature/ humidity**

WeatherHub external temperature/humidity

NEW

Transmitter with integrated temperature and humidity sensor for indoor use and external, waterproof temperature sensor (length 1.5 m)

TECHNICAL SPECIFICATIONS:

Measurement range:	Temperature: -40 to + 60 °C
External temperature: -50 to +110°C	
Air humidity: 0 to 99 % rel. humidity	
Range in open field:	approx. 200 m
Power supply:	Two 1.5 V type AAA batteries

ARTICLE NO.	
4269	**WeatherHub External temperature/humidity**

WeatherHub rain gauge

NEW

Transmitter with rain gauge

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 300 mm/h
Range in open field:	approx. 100 m
Power supply:	Two 1.5 V type AAA batteries

ARTICLE NO.	
4270	**WeatherHub rain gauge**

SENSORS FOR SMARTPHONES

Weather-Disc

Bluetooth thermal hygrometer for smart phones. Temperature and humidity readings transmitted via Bluetooth (BLE 4.0) with range up to 30 m. For controlling room climate and for local weather forecasts; free easy-to-use app, current weather with max/min temperature, chance of rain, wind force, perceived temperature and 5-day forecast

TECHNICAL SPECIFICATIONS:

Measurement range:	Temperature: -20 to +85 °C
	Air humidity: 0 to 99% rel. humidity

ARTICLE NO.	
4261	**Weather-Disc**

Thermal hygrometer

Thermal hygrometer can be plugged into the headphone jack, free easy-to-use app, max/min values, graphical trend displayed, adjustable alarm levels, dew point calculation, photo feature, logger function, share and print functions

TECHNICAL SPECIFICATIONS:

Measurement range:	Temperature: -20 to +60 °C
	Air humidity: 20 to 95 % rel. humidity

ARTICLE NO.	
4262	**Thermal hygrometer**

SMART PHONE SYSTEMS CHAPTER 18

SENSORS FOR SMARTPHONES

Insertion thermometer

All-purpose insertion thermometer made from stainless steel with 1.1m cable for plugging into the headphone jack, free easy-to-use app, graphical trend display

TECHNICAL SPECIFICATIONS:

Measurement range:	-40 to +250 °C

ARTICLE NO.	
4263	**Insertion thermometer**

Wind gauge

Wind gauge for measuring the current wind speed: can be plugged into the headphone jack, free easy-to use app, max/average values, graphical real-time recording of every measurement, live map with measurements from all users, small and compact, made from heavy-duty plastic.

TECHNICAL SPECIFICATIONS:

Measurement range:	2 to 24 m/s
Units:	m/s; km/h, knots, Beaufort

ARTICLE NO.	
4264	**Wind gauge**

Infrared thermometer

All-purpose insertion thermometer made from stainless steel with 1.1m cable for plugging into the headphone jack, free easy-to-use app, graphical trend display

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 90 °C

ARTICLE NO.	
4265	**Infrared thermometer**

MAGNIFIERS

Thread-Counting Magnifiers

4410/4411

4421

4419

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)

ARTICLE NO.	
4410	**Thread counter / folding magnifier** 12-x
4411	**Thread counter / folding magnifier** 8-x
4421	**Thread-counter with scale / folding magnifier (9-x)**
4419	**Thread counter with indicator needle (6-x)**

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:	Plastic, black

ARTICLE 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 AND MICROSCOPES CHAPTER 19

MAGNIFIERS

Illuminated magnifier

4420

4416

TECHNICAL SPECIFICATIONS:

Magnification:	10-x / 15-x
Lens:	With anti-static coating
Diameter (ø):	30 mm / 21 mm
Housing:	Plastic
Battery:	Three 1.5-V AAA battery

ARTICLE NO.	
4420	**Illuminated magnifier (10-x) with pouch**
4416	**Illuminated magnifier (15-x) with pouch**

MICROSCOPES

Baton microscope

TECHNICAL SPECIFICATIONS:

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

ARTICLE NO.	
4430	**Baton microscope with illumination**

USB microscope

Microscope with display on computer screen, for recording digital photos and brief videos. With six LEDs for illumination.

TECHNICAL SPECIFICATIONS:

Magnification:	10x – 40x / 150x
Lens:	1,600 x 18,000 pixels
Camera snap scans:	Snap scan up to 5 MP, with interpolation and video
Communication:	USB 2.0 with power supply
Hardware:	Windows 10, Vista and Windows 7
Dimensions and weight:	108 x 132 cm, 113 g

ARTICLE NO.	
4417	**USB microscope** Camera, stand, CD, USB cable

SOIL MEASUREMENTS

Penetrometer

New version

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 an analogue reading of the penetration resistance. 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.

The penetrometer is delivered with two cone-shaped tips. The small cone (with the smaller surface) is used for solidly packed soils while the large cone (with the larger surface) is used for softer soils. There are two displays corresponding to the type of cone being used which are calibrated based on the cone's surface area.

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 40 bar
Scale:	3 colours for each tip type
Penetration depth: max. 80 cm	
Classification:	10 cm

ARTICLE NO.	
5090	**Penetrometer** Supplied with 2 tips and spacers
	ACCESSORIES
5091	Small tip (½")
5092	Large tip (¾")
5088	Spacer

SOIL MEASUREMENTS

Soil probe

Small tip

Large tip

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).
The soil probe can also be used for tree care applications.
The soil probe is delivered with two cone-shaped tips. The cones have different surface areas; this allows you to measure in both compacted and loose soils.

TECHNICAL SPECIFICATIONS:

Measurement range:	1,000 mm
Marking scale:	every 100 mm
Dimensions and weight:	ø 8 x 1,150 mm, approx. 450 g

ARTICLE NO.	
5030	**Soil probe** Comes supplied with two tips
	ACCESSORIES
5031	Small tip
5032	Large tip

SOIL SAMPLING AUGER MADE FROM RUST-FREE STAINLESS STEEL

Pot/volume sampling auger

Sampling auger suitable for pots, container plants, smaller plant vessels and floriculture. Volume sampling auger, with scale, for removal of defined soil samples for purposes of NPK measurement (refer to page 19).

TECHNICAL SPECIFICATIONS:

Total length, groove length:	350, 300 mm
Outer/inner groove ø:	16 / 10 mm
Ball handle ø:	30 mm
Weight:	0.185 kg
Classification:	(only the 5001) 10 ml

ARTICLE NO.	
5000	**Sampling auger for pots**
5001	**Volume sampling auger** with scale

Hand-held sampling auger

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

TECHNICAL SPECIFICATIONS:

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

ARTICLE 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, groove length:	500, 300 mm
Outer/inner groove ø:	20, 14 mm

ARTICLE NO.	
5004	**Sampling auger**

SOIL SAMPLING AUGER CHAPTER 21

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, groove length:	560, 300 mm
Outer/inner groove ø:	17 / 11 mm
Weight:	0.55 kg

ARTICLE 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, groove length:	810, 300 mm
Outer / inner groove ø:	20 / 14 mm
Weight:	1.5 kg

ARTICLE NO.	
5006	**Sampling auger with foot rest, solid-built handle**

Sampling auger with foot rest

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

TECHNICAL SPECIFICATIONS:

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

ARTICLE 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, groove length:	810, 600 mm
Outer / inner groove ø:	22 / 15 mm
Weight:	1.25 kg

ARTICLE NO.	
5010	Standard type 60

Stripper for dislodging soil probes

Suitable for all sampling augers
except for the pot/volume sampling auger
(Article 5000 / 5001)

ARTICLE 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

ARTICLE NO.	
5600	Puller for the Pürckhauer

SOIL SAMPLING AUGER CHAPTER 21

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, groove length:	1,000, 600 mm
Outer/inner groove ø:	25 / 20 mm
Reinforced strike head, ø: 34 mm	
Weight:	2.9 kg

ARTICLE NO.	
5011	Type-60 Pürckhauer
5115	Replacement borer grip for the strike head (ø 38 mm)

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

ARTICLE NO.	
5012	Type-60 Pürckhauer
5112	Replacement borer grip for the strike head (ø 38 mm)

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, groove length:	1,050, 900 mm
Outer / inner groove ø:	25 / 17 mm
Reinforced strike head, ø:	38 mm
Weight:	3.5 kg

ARTICLE NO.	
5014	Type-90 Pürckhauer
5115	Replacement borer grip for the strike head (ø 38 mm)

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

ARTICLE NO.	
5016	Type-100 Pürckhauer
5115	Replacement borer grip for the strike head (ø 38 mm)

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, groove length:	1,170, 1,000 mm
Outer / inner groove ø:	30 / 24 mm
Reinforced strike head, ø:	38 mm
Weight:	3.5 kg

ARTICLE NO.	
5017	Type-100 Pürckhauer
5115	Replacement borer grip for the strike head (ø 38 mm)

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

ARTICLE NO.	
5018	Type-100 Pürckhauer
5115	Replacement borer grip for the strike head (ø 38 mm)

SOIL SAMPLING AUGER CHAPTER 21

SLEDGE HAMMERS

Simplex 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

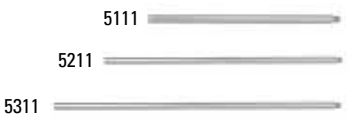
Type-III Simplex sledge hammer:

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

ARTICLE 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 wrench 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.

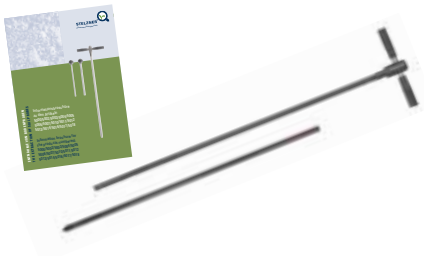
Rubber sheathing and notch for removing samples can be attached to the borer grip. All individual parts are interchangeable.

ARTICLE 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 length: 30 cm for 0 to 30 cm depth inner ø 30 mm, outer ø 38 mm
5210	Shovel length: 30 cm for 30 to 60 cm depth inner ø 25 mm, outer ø 33 mm
5310	Shovel length: 30 cm for 60 to 90 cm depth 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 21

SOIL SAMPLING AUGER MADE FROM RUST-FREE STAINLESS STEEL

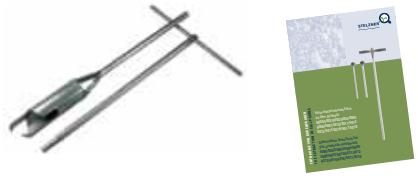
Two-part boring kit



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.

ARTICLE 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 1,185 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:	Overall length: 900 mm
	Boring penetration length: 300 mm
	Outer ø of bore section: 88 mm
	Inner ø of bored section: 8 mm
	Spoon slot in the insertion area: 70 mm
Extension:	Length: 650 mm
	Outer rod: 22 mm
	Inner rod: 16 mm

ARTICLE 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

ARTICLE NO.	
5900	**Stainless steel cross-section spade**

Other spade lengths are available on request.

LAB CONFIGURATION

NANOCOLOR® 500 D and PF 12

Photometric nutrient analysis

The NANOCOLOR® 500 D and PF 12 digital photometers are the next innovative step for our photometric product line. These instruments can be used for any water or waste water analysis task and are 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 graphic display is menu driven and capable of clearly displaying all key information (measured result, 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.

NANOCOLOR® 500 D

The auto-save function can be turned on and off in the configuration menu. Up to 3,000 on-site measurements can be made using the built-in heavy-duty high-power battery with charge controller. The unit can also be continuously operated using 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). An integrated laser scanner which is used for fully-automatic instant cuvette detection results in routine analyses that are quick and simple. 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:

	PF 12
Type:	Microprocessor controlled filter photometer: auto-test and auto-calibration functions; wavelength range: 340 to 860 nm
Lens:	Automatic filter wheel with 7 interference filters Sensitive to ambient light: for quick measurements with uncovered cuvette shaft
Wavelengths:	345 / 436 / 470 / 540 / 585 / 620 / 690 nm plus one compartment for an additional filter
Precision:	±2 nm, half-width: 10 to 12 nm
Light source:	Tungsten lamp
Detector:	silicon photocell
Zero compensation:	automatic
Measuring modes:	more than 100 pre-programmed tests (NANOCOLOR® tube tests and VISOCOLOR® ECO tests), absorbance, transmission, factor, standard, 10 custom-programmable methods
Measurement range:	± 3 E
Accuracy:	± 1 %
Long-term stability:	< 0.002 E/h
Cuvette holder:	Round cuvettes with 16 mm outer diameter
Data storage capacity:	200 measured values, GLP-compliant
Display:	Illuminated graphic display, 64 x 128 pixels, All key data is available at a glance: Result displayed with dimension specification, date, time, sample number, sample location and dilution
Usage:	Intuitive menu navigation, membrane keypad
Interfaces:	USB 2.0
Update:	Free updates available via Internet/PC
Operating range:	0 to 50°C, up to 90% relative humidity
Power supply:	USB power adapter, batteries or rechargeable batteries
Housing:	Waterproof, IP67
Dimensions and weight:	215 / 100 / 65 mm, 0.7 kg

	NANOCOLOR® 500 D
Type:	Microprocessor controlled beam-filter photometer: 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:	Tungsten spotlight lamp
Detector:	silicon photocell
Zero compensation:	automatic
Measuring modes:	**over 100 pre-programmed tests, 99 user-programmable methods absorbance, transmission, factor, kinetic, 2-point calibration**
Measuring range:	approx. 3 E, unsigned
Accuracy:	±1 %
Long-term stability:	< 0.002 E/h
Cuvette holder:	Round cuvettes with 14 mm inner diameter; rectangular cuvettes: 10, 20, 50 mm
Data storage capacity:	500 measurement value records, GLP-compliant
Display:	graphical back-lit display, 64 x 128 pixels, 10 languages
Usage:	bar codes , display menu, membrane keypad
Interfaces:	USB 1.1 and bi-directional RS-232 serial ports
Update:	via Internet / PC
Operating range:	0 to +50°C, up to 90% relative 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

ARTICLE NO.	
1850	**All-purpose photometer NANOCOLOR® 500 D**
1801	**All-purpose photometer PF12**
	Including software CD, operations manual, dust cover, power supply unit, data cable, USB cable and calibration cuvette, in a sturdy travel case.
	ACCESSORIES
1810	Nitrate NO_3-N, 0.3 to 22 mg/l; 20 per package
1812	Ammonium NO_4-N, 1 to 40 mg/l; 20 per package
1813	Phosphate $P_2 0_5$, 10 to 50 mg/l; 19 per package
1814	Potassium K, 2 to 50 mg/l; 20 per package
1815	Magnesium Mg, 5 to 50 mg/l Calcium Ca, 10 to 100 mg/l; 20 per package
1817	Iron Fe, 0.1 to 3.0 mg/l; 20 per package
1818	Copper Cu, 0.1 to 7.0 mg/l; 20 per package
1819	Zinc Zn, 0.1 to 4.0 mg/l; 20 per package
1820	Molybdenum Mo, 1.0 to 40 mg/l; 20 per package
1821	Manganese Mn, 0.1 to 10 mg/l; 20 per package
1822	Chloride Cl, 0.5 to 50 mg/l; 20 per package
1823	Sulphate SO_4, 10 to 200 mg/l; 20 per 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.
1860	Cylinder-stroke pipette, 0.2 to 1.0 ml, adjustable, with tip ejection mechanism

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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
Usage:	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 option for NANOCOLOR® T Set (enables fully-automatic calibration and creation of a testing certificate for test-equipment monitoring in compliance with DWA – A 704) Update via 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

ARTICLE NO.	
1855	**Thermoblock with hood and power cable**
	ACCESSORIES
1856	NANOCOLOR® T Set for calibration and temperature control

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

ARTICLE NO.	
6100	**Cabinet drier UM 200 with fully-isolated stainless steel door**

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
Maximum temperature:	1,100 °C
Voltage:	230 V 1/N
Power:	2.4 kW
Weight:	33 kg

ARTICLE 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.

ARTICLE 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 22

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

ARTICLE NO.	
6095	**Dewar vessel**

Water purifier cartridge

Water purifier cartridge for non-pressurized desalination

Non-pressurized desalination cartridge made of plastic and filled with regenerating ion exchange resin. Including riser tube and Sera filter fabric, 1.5 m inlet hose, 0.5 m discharge hose. Desalinated 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

ARTICLE NO.	
4031	**Desalination cartridge**
4038	**Connection kit** Connection hoses, uptake pipe, flow-through electrode with EC meter
4042	**Regeneration**

Lab accessories and individual components

ARTICLE 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** PE with elongated shape
0580	**250-ml graduated cylinder** PE with elongated shape
0570	**100-ml graduated cylinder** PE with elongated shape
0560	**10-ml graduated cylinder** PE with elongated shape

LAB CONFIGURATION

Scale

Manual pointer scale

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

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 250 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

ARTICLE NO.	
4060	**Manual pointer scale**

Scale

Electronic precision scale

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

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 500 g
Resolution:	0.1 g
Min. load:	0.1 g
Tray for scale:	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

ARTICLE NO.	
4069	**Electronic precision scale**

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

ARTICLE NO.	
4066	**Precision scale** with calibration weight of 200 g

NUTRIENT ANALYSIS CHAPTER 22

LAB CONFIGURATION

Scale

Electronic SOLAR scale

Solar-powered pesticide scale for the lab, with reserve solar energy function. Usage: 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 2,000 g)
Tray:	Plate: ø 125 mm
Housing:	Plastic
Dimensions and weight:	196 x 125 x 65 mm, 410 g

ARTICLE NO.	
4062	**Electronic SOLAR scale**

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

ARTICLE NO.	
4067	**Electronic scale**

Scale

Electronic pesticide scale

Electronic precision scale for pesticides, with RS 232 port, including adapter and batteries.
Switch: On/off, automatic tare

TECHNICAL SPECIFICATIONS:

Measurement range:	0 to 5,000 g
Resolution:	1.0 g
Weighing surface:	185 x 185 mm
Power supply:	Six 9-Volt batteries, or mains power connection
Weight:	3 kg

ARTICLE 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 diameter: 34 mm with 2 lenses, 4-x/8-x.

ARTICLE 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.

ARTICLE 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

Thirsty Light®

The digital Thirsty Light® provides a simple means for checking the soil moisture using a moisture meter with integrated Drypoint TM technology. The Thirsty Light® signals with an unobtrusive flashing light when the soil is too dry so that you see when water is required.

TECHNICAL SPECIFICATIONS:

Overall dimensions:	170 x 22 x 20 mm
Sensor length:	105 mm
Power supply:	Two 1.5-V (AG13) batteries

ARTICLE NO.	
4209	**Thirsty Light®**
4290	**Thirsty Light®** Box with 12 pcs. = unit price

CUSTOM-PRINTED MARKETING ITEMS

Fertometer®

Checking the fertilization levels in potted plants

Easy-to-use meter for measuring fertilization in potted plants The nutrient component of the soil is shown by the multi-coloured LED readout and a fertilization suggestion is made at the same time. The Fertometer® delivers precisely measured readings and is housed in a rugged and durable case.

TECHNICAL SPECIFICATIONS:

Measurement precision:	< 3%
Display:	LED
Measuring technology:	EC (electrical conductivity)
Power supply:	One nine-volt battery, size 6LR61
Dimensions and weight:	270 x 50 x 35 mm; approx. 170 g

ARTICLE NO.	
8008	**Fertometer®**
8009	**Fertometer®** Box with 12 pcs. = unit price

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.

ARTICLE NO.	
4011	**Rain gauge with pole fitting**
4203	**Rain gauge with rotating ring**
4204	**Rain gauge with basket**

CUSTOM-PRINTED MARKETING ITEMS

Thermometer

Minimum/maximum plastic thermometer with clearly readable 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.

ARTICLE 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

TEL ++49(0)36601/93 49 06 FAX ++49(0)36601/93 49 07 WWW.STELZNER.DE

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: DE83 1007 0024 0777 9333 01
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	Price per unit (net) €
		(Soil sample orders found on back side of form)	
		Postage and handling *)	

* Within Germany: max. size of 1.20 x 0.60 x 0.60 m and max. weight of 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			
7006	☐ Nitrogen N_{min} (ammonium and nitrate)	7007	☐ + Fertilizer recommendation
7002	☐ Total nitrogen		
7008	☐ Basic nutrient examination: pH, K, P, Mg		
Topsoil / humus			
7012	☐ Individual samples		
7018	☐ 2 to 4 samples each		
7019	☐ 5 or more samples		
7013	☐ Sulphur S_{min}	7004	☐ + Fertilizer recommendation
7010	☐ Clay content		
Heavy metals			
7016	☐ Heavy metal content		
7020	☐ per element (not including mercury or arsenic)		
7014	☐ Calcium		
7009	☐ Salt content		
Compost examination			
7003	☐ Small compost analysis – light soluble nutrients: nitrate-N, ammonium-N, P, K, Mg, pH, salt content, volume weight, water content, organic matter (loss due to burning/heating)		
7004	☐ Mid-level compost analysis – similar to small compost analysis plus total plant nutrients: Kjeldahl nitrogen, P, K, Mg, Ca		
Fertilizer examination			
7011	☐ Total content of N, P, K, organic matter, heavy metals and sulphur. Similar to soil examinations.		
Irrigation water examination			
7017a	☐ **Nitrate**	7017g	☐ **Ammonium**
7017b	☐ **Phosphate**	7017h	☐ **Sulphate**
7017c	☐ **Calcium**	7017i	☐ **Sodium**
7017d	☐ **Magnesium**	7017j	☐ **Potassium**
7017e	☐ **Chloride**	7017k	☐ **Iron**
7017f	☐ **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.

Date Signature

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Notes

Legal details

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GAS ANALYSIS EQUIPMENT
BIOGAS ANALYSIS EQUIPMENT
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AGRICULTURAL EQUIPMENT

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