

# SOIL MOISTURE SAMPLING

You will return to the contents of P1 SOIL by clicking the pictogram



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Soil moisture sampling is the sampling of soil moisture in the unsaturated zone of the soil. There are mobile systems and setups with a permanent location for continuous sampling. Depending on the purpose of the research it is possible to select between samplers in which the sampling is done via a thin PES tube or via ceramic, glass or plastic cups. All samplers are available in various diameters and designs. With these soil moisture sampling systems the soil moisture is extracted directly and undiluted from the soil.

## Rhizon soil moisture samplers

With the Rhizon soil moisture sampler we supply a range of miniature soil moisture samplers. The Rhizon samplers are used for repeated and reliable sampling of all dissolved components in the soil solution. The porous plastic material (PES) wets spontaneously and has standard 0.15 micron pores. The samplers are supplied with coextruded tubing (PE inside / PVC outside) 1 mm internal diameter, luer connector and protective cap. The sampler is reinforced by a wire. Dissolved organic and inorganic matter will not absorb on the

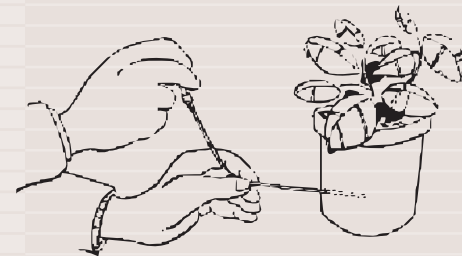
soil moisture sampler. The sampler is placed preferably horizontally in moist soil. Water acts as a lubricant during inserting. Due to the minimal disturbance the soil will quickly settle, resulting in a good sampler-soil contact. The standard Rhizon soil moisture samplers are inserted through the wall of undisturbed soil columns and pots with plants. A sample is obtained by placing the sampler under vacuum. The vacuum is obtained using a vacuum tube or a syringe. The Rhizon soil moisture samplers are supplied in various designs.

For inserting in pots during filling, the Rhizon soil moisture sampler type **FLEX** with nylon strengthening wire is available.

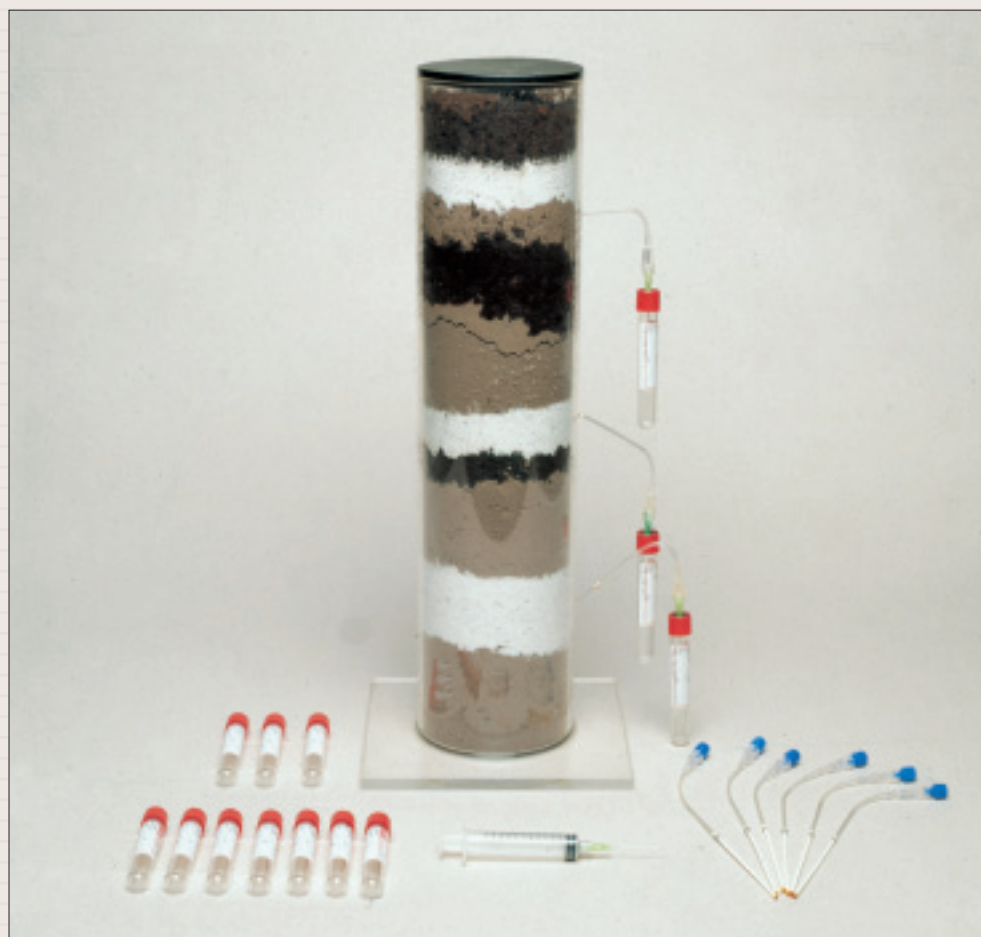
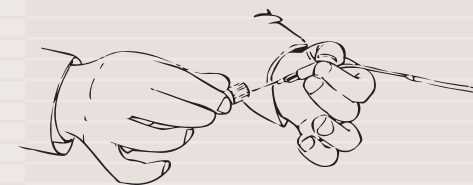
For sampling metals a special Rhizon soil moisture sampler type **MOM** is available, with a length of 10 cm and a diameter of 2.5 mm, with glassfiber reenforced strengthening wire and 10 cm coextruded tubing.

The Rhizon soil moisture sampler type **MOM** and type **SMS** (with stainless steel strengthening wire) are designed for sampling in undisturbed soil cylinders (core samples) or in pots with growing plants.

A Rhizon soil moisture sampler is placed in a pot.



To extract a sample the soil moisture sampler is connected to a needle. Next the needle is pushed in the vacuum tube.



Rhizon soil moisture samplers

## BENEFITS

### 19.21 Rhizon soil moisture samplers

- Micro & Macro "roots" sample moisture
- Ideal for all types of lab and field research
- Cheap samplers allow large scale use
- Simple syringes act as pumps and samplers
- Inert construction allows for many analyses
- Can be used at meters depth
- Frost resistant
- Can be extended horizontally also



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# SOIL MOISTURE SAMPLING

## 19.21.SA Rhizon soil moisture sampling set

The Rhizon soil moisture sampler is available in a standard set with: Rhizon soil moisture samplers, type MOM, with a length of 10 cm (complete with PVC/PE tubing, connectors and protective caps), a set needles with protective caps and a set of glass vacuum tubes with a 9 ml contents.

The standard set can be extended with various accessories such as: short Rhizon soil moisture samplers (5 cm porous material), syringes (to be used instead of vacuum tubes) connectors for connecting the syringes (including spacers for blocking the syringes), (black) PE extension tube, silicone connecting tubing to connect the extension tubing to the soil moisture samplers.

The **Macro Rhizon** soil moisture sampler is especially suited for use in the field. The sampler has a length of 9 cm and a diameter of 4.5 mm. For installation at greater depths a standard sampler with PVC extension pipe can be used.

## Applications

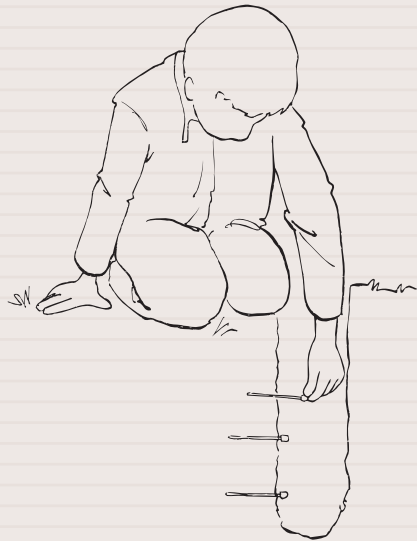
The Rhizon soil moisture samplers are very suitable for pot-, cylinder- and column research (**Macro Rhizons** for field research). Rhizon samplers are used when several soil solution samples are needed of the same soil volume in research of:

- Plant uptake of soluble nutrients as nitrate.
- Solubility of metals in soil.
- Transport of soluble components in soil.
- Accumulation of salts, etc.
- Environmental research.

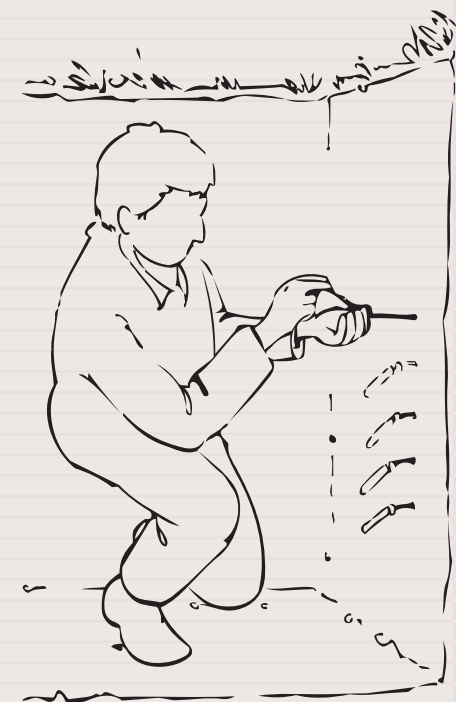
## Advantages

- Minimal disturbance of hydraulic properties of the soil.
- Low dead volume < 0.5 ml.
- Minimal ion exchange capacity (less than soil).
- pH is not changed by sampling.
- Complete sampling systems (can be cleaned before use to suit specific demands).
- Sample is filtered and can be analysed directly.
- Inexpensive.

The Rhizon soil moisture samplers are placed in the wall of a bore hole.



Soil moisture samplers in a profile pit.



Rhizon soil moisture samplers



Rhizon with vacuum tube and syringe



Macro Rhizons

# SOIL MOISTURE SAMPLING

## Mobile soil moisture sampling systems

**12.01.SA** Soil moisture sampler system, minimal set for singular sampling to a depth of 1.5 m

**12.01.SB** Soil moisture sampler system, standard set for multiple sampling to a depth of 1.5 m

Because of the small diameter of the ceramic cup applied and the fact that the probes can be extended, these are fast and mobile systems for sampling in different places and at various depths.

Both sets operate according the same principle. A hollow porous tube is placed in the soil. By creating an under pressure on the inside of the porous tube (with the vacuum pump or vacuum tank) the soil moisture will be drawn in.

The minimal set for singular sampling (12.01.SA) among other items, contains: an upper part, a gouge auger (for pre-drilling), a probe with porous cup, a stainless steel extension pipe for the probe, a push-

/pull handle, a vacuum pump with manometer, teflon tube, a silicon stopper and a case with sampling bottles, various accessories and a carrying bag.

In addition to the above mentioned, the set for multiple sampling (12.01.SB) also contains: an extension piece for the gouge auger, a number of extra insertion probes with extension pipes, suspension clamps for sampling bottles, a vacuum tank with pump suitable for connection of a maximum of 5 insertion probes, a utility rod (for safe detection of cables, lines and pipes) an aluminium carrying-/transport case.

### Applications

The sets are applied for the determination, among other facts, of:

- Salinity measurements in the soil after irrigation or the application of fertilizers or manure.
- The washing in or out of various elements and compounds.
- Pollution in the unsaturated zone.



Insertion probe and extension pipe



Soil moisture sampling system (SA)

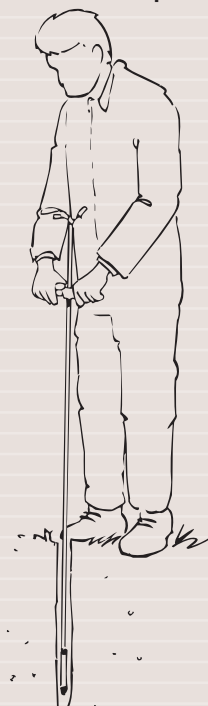


Vacuum tank with vacuum pump

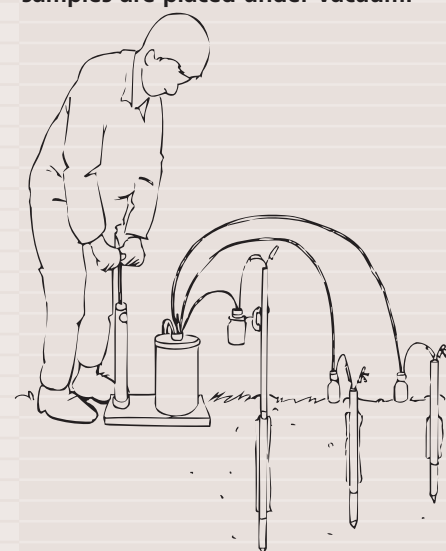


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Using the push-/pull handle the probe is pushed into the pre-drilled hole.



Using the vacuum tank several samples are placed under vacuum.



## BENEFITS

### 12.01.SA Soil moisture sampler system

- Mobile system for soil moisture composition
- Pure Al<sub>2</sub>O<sub>3</sub> ceramic allow many analyses
- Ceramic tube field / user replaceable
- 12.01.SB gives averages in a short field time



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# SOIL MOISTURE SAMPLING

## Samplers with large ceramic cup

### 12.03 Soil moisture samplers with large ceramic cup, standard set

The soil moisture samplers with large ceramic cup are used for the same purposes as described previously. However, this type of sampler is buried permanently on a fixed location and at a fixed depth. Because of the larger cup it is possible to collect a larger amount of soil moisture in a relatively shorter period of time. The soil moisture samplers with a large ceramic cup are available in various lengths.

An Edelman auger is used for pre-drilling the hole. In order to obtain proper contact between soil and sampler synthetic sand can be used.

The under pressure is created using a vacuum pump fitted with a manometer.

The sample can be collected in a sampling bottle.

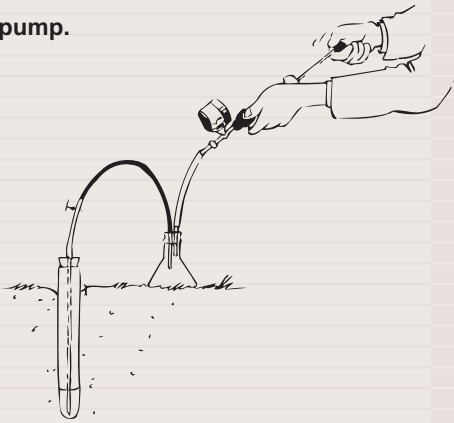
The standard set consists of 3 soil moisture sampler with length 30, 60 and 90 cm, a vacuum pump with manometer, sample bottles, silicon stoppers, teflon tube, Edelman auger, handle and a container with synthetic sand for installation of the soil moisture samplers.

Samplers with a length up to 150 cm are available on request.

Holes of various depth are augered to install the soil moisture samplers.



The soil moisture collected is pumped into the bottle using the vacuum pump.



## BENEFITS

### 12.03 Soil moisture sampler large ceramic cup

- Cheap and simple
- Perfect for low interaction chemicals (nitrate)
- Sturdy samplers for long term installation
- Body of trace metal free PVC
- Sample stored in body; no separate jars
- High quality 92% pure Al<sub>2</sub>O<sub>3</sub> porous cups
- Simple installation, use, and sub-sampling
- Sample collected by inserting a "catheter"



Soil moisture samplers with large ceramic cup, standard set

# SOIL MOISTURE SAMPLING

## Samplers with glass / plastic cup

Soil water studies are conducted to examine the concentrations of soil water compounds, e.g. plant nutrients, or pollutants, and their flux downwards to the groundwater. Until the 1990s almost all those studies were made with ceramic suction cups. Unfortunately the ceramic material affects the concentration of many solutes due to adsorption processes, so it is not suitable for these compounds of the soil solution. The glass and plastic suction cups and plates were specially developed to solve these problems. If preferential flow occurs, suction plates give a more realistic signal of water fluxes in soils as they get water out of larger areas than suction cups. Suitability of suction cup/plate materials for the examination of different solutes in soils are as follows:

- Pesticides, DOC: use glass
- Phosphate: use glass or plastics
- Nitrate, chloride, bromide, sulfate, sodium: all are suitable
- Heavy metals: use plastics

### 12.52 Soil water sampler set with conical porous glass suction cup.

The suction cups of these samplers are developed especially for the examination of organic solutions in soil. The borosilicate porous part has an extreme low sorption of agricultural control chemicals, total carbon, phosphate and PAH's. The standard set comprises: 3 samplers with diameter 22/16 mm, length 30, 60 and 90 cm, sample bottles with silicon stoppers, vacuum pump and soil insertion auger set.

### 12.53 Soil water sampler set with porous plastic suction cup.

This plastic suction cup was developed for the examination of anorganic solutes in soil, especially for those with high sorption coefficients like heavy metals and phosphate. Its porous part is a sandwich construction consisting of a nylon membrane filter and a porous polyethylene substructure. The set consists of: 3 samplers, diameter 20 mm, length 30, 60 and 90 cm, sample bottles with silicon stoppers, vacuum pump and soil insertion auger set.

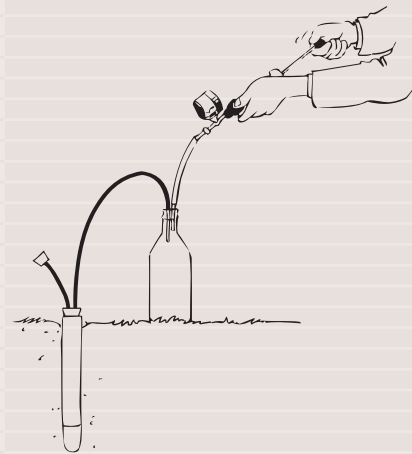


Soil water samplers with glass and plastic porous cup



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## Collecting soil water using the vacuum pump.



### BENEFITS 12.52 Soil water sampler glass cup

- Only good choice for agrochemicals analyses
- Will correctly sample phosphates and TOC
- Installation as other samplers

### BENEFITS 12.53 Soil water sampler plastic cup

- Perfect for research on (trace) metals
- Perfect for  $\text{NO}_3^{2-}$ ,  $\text{SO}_4^{2-}$ , Br, Cl, Na<sup>+</sup>

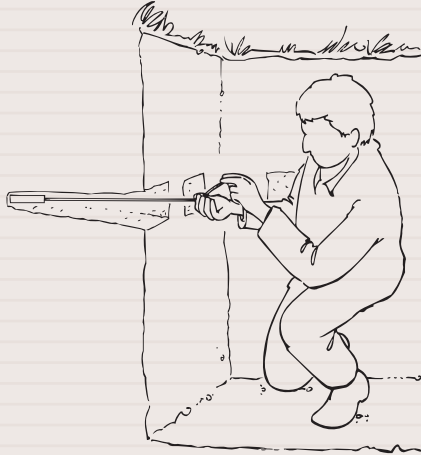


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After installing a glass soil water sampling plate in a profile pit, the hole is filled and the tube is led to the surface.



## BENEFITS

### 12.56 Soil water sampling plate, glass

- Will also determine soil moisture flux
- For use in lab and field lysimeters

## BENEFITS

### 12.57 Soil water sampling plate, plastic

- Will also determine soil moisture flux
- Can be coupled/extended to large surfaces
- For use in lab and field lysimeters

# SOIL MOISTURE SAMPLING

## Glass / plastic sampling plates

### 12.56 Soil water sampling plate, glass, standard set

This glass suction plate was developed especially for the extraction of soil solution on large areas and its examination on organic solutes (Pesticides, DOM). It consists of a multilayer borosilicate glass plate that is melted down into a glass basin. This construction increases the rigidity as well as the water uptake of the plate, because the water can flow through the whole plate area at the same time. No use is made of additives or bonding materials, which can irritate laboratory analyses after collecting soil solution samples. The sampling tube is fixed to the plate without any adhesives, because sealings and glues can release DOC to the sampled soil water.

The plates are preferably installed horizontally from a soil profile wall or vertically from the soil surface.

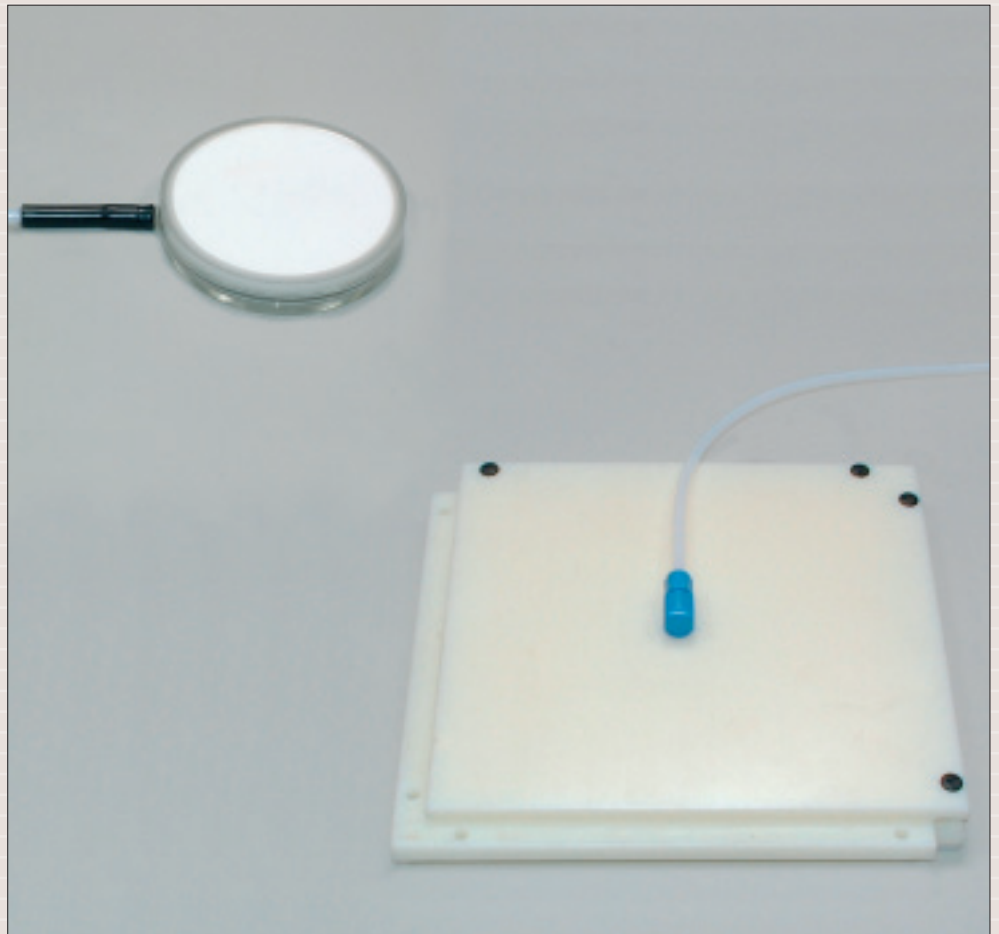
The standard set comprises: soil water sampling plates of glass with a diameter of 100 mm (with teflon sampling tube, sampling bottle with silicone stopper and a

### 12.57 Soil water sampling plate, plastic, standard set

The plastic suction plates are especially suited for the extraction of soil solution on large areas and its examination on heavy metals and phosphate. Because of their low charged surfaces, plastics are the best materials for these purposes.

The filter elements have a tongue and groove system and can be put together to areas of any size. Due to the extraction of soil water over a large area together with low adsorption losses quantitative examinations of solute fluxes are possible. The filter part of the suction plates consists of a porous polyethylene substructure and a hydrophile polyamide membrane filter which is protected against damaging by a cover shield.

The standard set comprises: a square plastic porous soil water sampling plate 250 x 250 mm incl. teflon sampling tube, sampling bottle with silicone stopper and a vacuum pump with manometer.



Soil water sampling plate glass and plastic



Art.no.	Description	Qty. in set	Art.no.	Description	Qty. in set
<b>Soil moisture sampling (P1.65)</b>				developed for sampling metal organic matter. Set of 10 pieces	
	<b>RHIZON SOIL MOISTURE SAMPLERS</b>			<b>Rhizon (2.5 mm model) type Rhizon Flex to be positioned (installed) during filling of pots and cylinders.</b>	
	The Rhizon soil moisture samplers are supplied with standard Luer Lock (LL) connectors and tubing with 1 mm. internal diameter. The Rhizon family consists of four types of samplers: - standard sampler type SMS with stainless steel (SS 316) strengthening wire. - samplers type MOM with glassfiberepoxy strenthening wire. - Samplers type FLEX with nylon strengthening wire. - MacroRhizons with glassfiber strengthening rod.		19.21.25	Rhizon soil moisture sampler, type FLEX, length 10 cm, Ø 2.5 mm, with nylon strengthening wire and 60 cm coextruded tubing (PE). Incl. 30 cm silicone tubing 6x2 mm. specially developed for positioning during filling of pots and cylinders. Set of 10 pcs.	
	We supply one basic set standard samplers with accessories.		19.21.35	<b>MacroRhizons (4.5 mm model) for inserting at 45 degrees in an augered hole or horizontally in the field.</b>	
<b>19.21.SA</b>	<b>Rhizon soil moisture sampling set, standard set for sampling of soil moisture with Rhizon soil moisture samplers, syringes and vacuum tubes</b>		19.21.36	MacroRhizon soil moisture sampler, length 9 cm, Ø 4.5 mm., with glass fiber strengthening rod and 10cm tubing. Set of 10 pcs.	
**19.21.21	Rhizon soil moisture sampler, type MOM, length 10 cm, Ø 2.5 mm, with glass fibre reinforced strengthening wire and 10 cm co extruded tubing(PE). Specially developed for sampling metal organic matter. Set of 10 pieces	1	19.21.37	Spare tip for MacroRhizon soil moisture sampler. Set of 10 pcs.	
**19.21.02	Set of needles, length 40 mm, Ø 0.8 mm, incl. protecting cap, 10 pieces.	1		<b>Accessories for extending the different types of samplers.</b>	
**19.21.03	Vacuum tubes, glass, contents 10 ml, set of 100 pieces, limited shelf life	1	19.21.13	Silicone tubing Ø 6x2 mm, length 120 cm. For connection of extension tubing. Incl. guide wire.	
	<b>Rhizon (2.5 mm models) type SMS and type MOM for inserting through wall of pot and cylinder with settled soil or undisturbed core.</b>		19.21.14	Extension tubing for Rhizon soil moisture samplers, black polyethylene, Ø 1x3 mm, reel of 50 m	
19.21.01	Rhizon soil moisture sampler, type SMS, length 10cm, Ø 2.5 mm, with stainless steel strengthening wire, complete with 10 cm pvc-tube, male connector and protecting cap, set of 10 pieces			<b>Accessories for sampling (two options):</b> - with needles and vacuum tubes. - with disposable syringe and connectors.	
19.21.05	Rhizon soil moisture sampler, type SMS, length 5 cm, Ø 2.5 mm, with stainless steel strengthening wire, complete with 10 cm pvc-tube, male connector and protecting cap, set of 10 pieces		19.21.02	Set of needles, length 40 mm, Ø 0.8 mm, incl. protecting cap, 10 pieces	
19.21.21	Rhizon soil moisture sampler, type MOM, length 10 cm, Ø 2.5 mm, with glass fibre reinforced strengthening wire and 10 cm co extruded tubing(PE). Specially		19.21.03	Vacuum tubes, glass, contents 10 ml, set of 100 pieces, limited shelf life.	
			19.21.04	Plastic syringe with adaptor and spacer 7 cm, Contents 10 ml, graduation in 0.2 ml, set of 10 pcs.	
			19.21.10	Set of 10 connectors to connect Rhizon soil moisture sampler to syringes 2*LL female, + 10 spacers 7 cm for syringes	



## PARTS LIST

Art.no.	Description	Qty. in set	Art.no.	Description	Qty. in set
	<b>Optional accessories for sampling:</b>			connection pipes and 2 closing clips	
19.21.18	Stopcock, 2 way for sampler flushing without vacuum loss. Set of 10 pieces.		**12.01.07	Sample bottle at 250 cc with glass stopper	10
	<b>Accessories for Macro-Rhizons (for extension of sampler 19.21.36).</b>		**12.01.08	Aluminium case for 10 sample bottles at 250 cc	1
19.21.42	Extension pipe for MacroRhizon length 50 cm. Set of 10 pces.		**12.01.10	Ceramic cup for moisture probe	1
19.21.44	Extension tubing for Macro-Rhizon, length 100 cm, with connectors. Set of 10 pces.		**01.14	Carrying bag for field equipment, with two shoulder straps (backpack model), (inside) Ø 17x150 cm	1
19.21.45	Extension tubing for Macro-Rhizon, length 50 cm, with connectors. Set of 10 pces. Incl. 60 cm silicone tubing 6x2 mm.				
19.21.49	Plastic syringe with 10 cm spacer for MacroRhizons, contents 30 ml. Set of 10 pces		<b>12.01.SB</b>	<b>Soil moisture sampling system, standard set for multiple sampling to a depth of 1.5 m</b>	
	<b>Tools for insertion of MacroRhizons.</b>		**01.10.17.B	Handle, normal, 60 cm, with all synthetic, detachable grip (incl. coupling sleeve), bay.	1
04.02.01.30.B	Gouge auger, bottom part, op. length 50 cm, bay., Ø 30 mm		**04.02.01.30.B	Gouge auger, bottom part, op. length 50 cm, bay., Ø 30 mm	1
01.10.17.B	Handle, normal, 60 cm, with all synthetic, detachable grip (incl. coupling sleeve), bay.		**04.05.01.20	Bent spatula, breadth 20 mm	1
01.10.07.B	Extension rod, 100 cm (incl. coupling sleeve) bay.		**01.10.07.B	Extension rod, 100 cm (incl. coupling sleeve) bay.	1
04.05.01.20	Bent spatula, breadth 20 mm		**12.01.04	Moisture probe with ceramic cup Ø 18 mm, length 50 cm, incl. transport tube. The ceramic cup has a parity of 99.8 % Al <sub>2</sub> O <sub>3</sub>	5
19.21.51	Insertion tool for MacroRhizon total length 100 cm (to check soil for stones etc. before inserting a MacroRhizon).		**12.01.05	Stainless steel extension pipe with 2 inner hoses, length 100 cm	5
	<b>MOBILE SOIL MOISTURE SAMPLING SYSTEMS</b>		**12.01.06	Vacuum tank with vacuum pump (incl. 10 m coupling hose) suitable for 5 moisture probes, contents 6.7 liter	1
	<b>The mobile soil moisture sampling system is supplied in two standard designs.</b>		**12.01.03	Silicon stopper with 2 connection pipes and 2 closing clips	6
<b>12.01.SA</b>	<b>Soilmoisture sampling system, minimal set for singular sampling to a depth of 1.5 m</b>		**12.01.07	Sample bottle at 250 cc with glass stopper	10
**01.10.17.B	Handle, normal, 60 cm, with all synthetic, detachable grip (incl. coupling sleeve), bay.	1	**12.01.08	Aluminium case for 10 sample bottles at 250 cc	1
**04.02.01.30.B	Gouge auger, bottom part, op. length 50 cm, bay., Ø 30 mm	1	**12.01.12	Clamp for sample bottle	5
**04.05.01.20	Bent spatula, breadth 20 mm	1	**12.01.11	Push-/pull handle, Ø 18 mm	1
**12.01.04	Moisture probe with ceramic cup Ø 18 mm, length 50 cm, incl. transport tube. The ceramic cup has a parity of 99.8 % Al <sub>2</sub> O <sub>3</sub>	1	**12.01.10	Ceramic cup for moisture probe 12.01.04, Ø 18 mm, in protective tube. The ceramic cup has a purity of 99.8 % Al <sub>2</sub> O <sub>3</sub>	5
**12.01.05	Stainless steel extension pipe with 2 inner hoses, length 100 cm	1	**01.10.09.B	Coupling sleeve	1
**12.01.11	Push-/pull handle, Ø 18 mm	1	**01.15.01	Utility probe with cone Ø 19 mm, fibre glass, length 105 cm, Ø shaft 12.5 mm. For safely checking the substratum for cables, tubes and pipes	1
**12.01.20	Vacuum pump with manometer	1	**01.11.02	Aluminium transport case, dim. 108x23x14cm (outside)	1
**12.20.22	Teflon tube, Ø 2x4 mm, roll of 10 m	1	**01.11.02.01	Padlock	1
**12.01.03	Silicon stopper with 2	1		<b>SAMPLERS WITH LARGE CERAMIC CUP</b>	
			<b>12.03</b>	<b>Soil moisture sampler with big ceramic cup. Complete standard set consisting of 3 samplers with Ø 48 mm (length 30, 60 and 90 cm), 3 samples bottles with stoppers, hand vacuum pump and insertion auger set with accessories.</b>	





Art.no.	Description	Qty. in set	Art.no.	Description	Qty. in set
**12.03.02	Soil moisture sampler with big ceramic cup and stopper assembly, Ø 48 mm, total length 30 cm	1		and plastic shaft. Ø 22/16 mm. Total length 60 cm.	
**12.03.04	Soil moisture sampler with big ceramic cup and stopper assembly, Ø 48 mm, total length 60 cm	1	**12.52.03	Soil water sampler with conical porous glass suction cup. Supplied with double tube system (Teflon) and plastic shaft. Ø 22/16 mm. Total length 90 cm.	1
**12.03.06	Soil moisture sampler with big ceramic cup and stopper assembly, Ø 48 mm, total length 90 cm	1	**12.01.07	Sample bottle at 250 cc with glass stopper	3
**12.01.07	Sample bottle at 250 cc with glass stopper	3	**12.01.03	Silicon stopper with 2 connection pipes and 2 closing clips	3
**12.01.03	Silicon stopper with 2 connection pipes and 2 closing clips	3	**12.01.20	Vacuum pump with manometer	1
**12.01.20	Vacuum pump with manometer	1	**01.02.02.04.B	Edelman auger, bottom part, comb.type, bay., Ø 4 cm	1
**12.20.22	Teflon tube, Ø 2x4 mm, roll of 10 m	1	**04.02.01.20.B	Gouge auger, bottom part, op. length 50 cm, bay., Ø 20 mm	1
**01.02.02.07.B	Edelman auger, bottom part, comb.type, bay., Ø 7 cm	1	**04.05.01.20	Bent spatula, breadth 20 mm	1
**01.10.01.B	Handle, normal, 60 cm, bay. (incl. coupling sleeve)	1	**01.10.17.B	Handle, normal, 60 cm, with all synthetic, detachable grip (incl. coupling sleeve), bay.	1
**08.01.09	Container synthetic sand, particle size about 73 micron, contents 12.5 kg			<b>Individual samplers with cylindrical glass cups (Ø 32 mm)</b>	
	<b>Individual samplers:</b>		12.52.11	Soil water sampler with cylindrical porous glass suction cup. Supplied with double tube system (Teflon) and plastic shaft. Ø 32 mm. Total length 30 cm.	
12.03.02	Soil moisture sampler with big ceramic cup and stopper assembly, Ø 48 mm, total length 30 cm		12.52.12	Soil water sampler with cylindrical porous glass suction cup. Supplied with double tube system (Teflon) and plastic shaft. Ø 32 mm. Total length 60 cm.	
12.03.04	Soil moisture sampler with big ceramic cup and stopper assembly, Ø 48 mm, total length 60 cm		12.52.13	Soil water sampler with cylindrical porous glass suction cup. Supplied with double tube system (Teflon) and plastic shaft. Ø 32 mm. Total length 90 cm.	
12.03.06	Soil moisture sampler with big ceramic cup and stopper assembly, Ø 48 mm, total length 90 cm				
12.03.08	Soil moisture sampler with big ceramic cup and stopper assembly, Ø 48 mm, total length 120 cm				
12.03.10	Soil moisture sampler with big ceramic cup and stopper assembly, Ø 48 mm, total length 150 cm				
	<b>Spare parts for samplers:</b>				
12.03.20	Stopper assembly for soil moisture sampler with cup Ø 48 mm				
	<b>SAMPLERS WITH GLASS/ PLASTIC CUPS</b>				
<b>12.52</b>	<b>Soil water sampler with conical porous glass suction cup. Compl. Standard set consisting of 3 sampler with Ø 22/16 mm (length 30, 60 and 90 cm), 3 sample bottles with stoppers, hand vacuum pump and insertion auger set.</b>		<b>12.53</b>	<b>Soil water sampler with porous plastic cup. Compl. Standard set with 3 samplers with Ø 20 mm (length 30, 60 and 90 cm), 3 sample bottles with stoppers, hand vacuum pump and insertion auger set.</b>	
**12.52.01	Soil water sampler with conical porous glass suction cup. Supplied with double tube system (Teflon) and plastic shaft. Ø 22/16 mm. Total length 30 cm.	1	**12.53.01	Soil water sampler with porous plastic suction cup. Supplied with double tube system (Teflon) and plastic shaft. Ø 20 mm. Total length 30 cm.	1
**12.52.02	Soil water sampler with conical porous glass suction cup. Supplied with double tube system (Teflon)	1	**12.53.02	Soil water sampler with porous plastic suction cup. Supplied with double tube system (Teflon) and plastic shaft. Ø 20 mm. Total length 60 cm.	1
			**12.53.03	Soil water sampler with porous plastic suction cup. Supplied with double tube system (Teflon) and plastic shaft. Ø 20 mm. Total length 90 cm.	1
			**12.01.07	Sample bottle at 250 cc with glass stopper	3
			**12.01.03	Silicon stopper with 2 connection pipes and 2 closing	3



## PARTS LIST

Art.no.	Description	Qty. in set	Art.no.	Description	Qty. in set
	clips				
**12.01.20	Vacuum pump with manometer	1			
**01.02.02.04.B	Edelman auger, bottom part, comb.type, bay., Ø 4 cm	1			
**04.02.01.20.B	Gouge auger, bottom part, op. length 50 cm, bay., Ø 20 mm	1			
**04.05.01.20	Bent spatula, breadth 20 mm	1			
**01.10.17.B	Handle, normal, 60 cm, with all synthetic, detachable grip (incl. coupling sleeve), bay.	1			
	<b>Individual samplers with plastic cups (Ø 32 mm).</b>				
12.53.11	Soil water sampler with porous plastic suction cup. Supplied with double tube system (Teflon) and plastic shaft. Ø 32 mm. Total length 30 cm.				
12.53.12	Soil water sampler with porous plastic suction cup. Supplied with double tube system (Teflon) and plastic shaft. Ø 32 mm. Total length 60 cm.				
12.53.13	Soil water sampler with porous plastic suction cup. Supplied with double tube system (Teflon) and plastic shaft. Ø 32 mm. Total length 90 cm.				
<b>12.56</b>	<b>Soil water sampling plate. Compl. standard set consisting of 3 glass plates with Ø 100 mm, 3 sample bottles with stoppers and hand vacuum pump.</b>				
**12.56.01	Soil water sampling plate. Round porous glass plate, Ø 100 mm. Supplied with 3 m sampling tube (Teflon).	3			
**12.56.91	Sampling bottle (brown glass) with silicone stopper, content 1 liter.	3			
**12.01.20	Vacuum pump with manometer	1			
<b>12.57</b>	<b>Soil water sampling plate. Compl. standard set consisting of 1 square porous plastic plate (250x250 mm), 1 sampling bottle (1 liter) and hand vacuum pump.</b>				
**12.57.01	Soil water sampling plate. Square porous plastic plate 250x250 mm. Torque and groove connection system. Incl. 3 m sampling tube (Teflon).	1			
**12.56.91	Sampling bottle (brown glass) with silicone stopper, content 1 liter.	1			
**12.01.20	Vacuum pump with manometer	1			