1908DLK

OPERATING INSTRUCTIONS

1908D2.5L10K05 Micro Samplers Kit

August 2008

(Fig 1) Micro Sampler Kit

Micro Samplers are miniature, disposable pore water samplers. They are ideal for extraction work in column studies and other small containers, when space, congested point sampling may itself influence the study. Composed of porous hydrophilic plastic, these samplers wet spontaneously making them ideal for many unusual applications.

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CAUTIONS & WARNINGS

- Sharp needles! Keep protective cap on until use.
- Do not puncture glass vials prior to use - Tubes are evacuated and will result in air filling
- Keep entire kit in cool dry place.

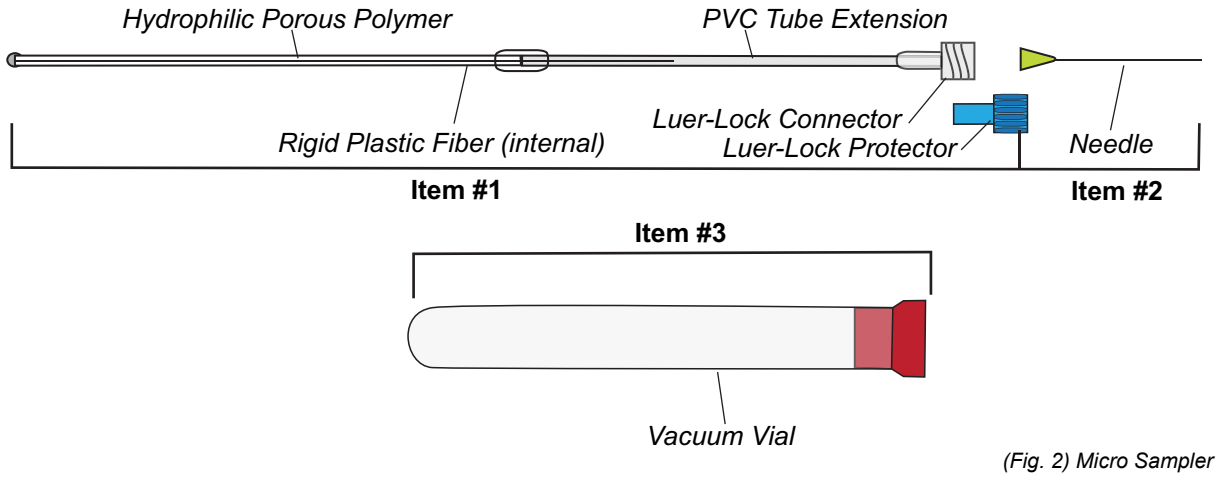
WARRANTY & LIABILITY

Soilmoisture Equipment Corp. (SEC) warrants all products manufactured by SEC to be free from defects in materials and workmanship under normal use and service for twelve (12) months from the date of invoice provided the section below has been met.

Soilmoisture Equipment Corp. (SEC) is not liable for any damages, actual or inferred, caused by misuse or improper handling of its products. SEC products are designed to be used solely as described in these product operating instructions by a prudent individual under normal operating conditions in applications intended for use by this product.

AQUAINT YOURSELF WITH THE PARTS

The standard *Micro Sampler*, consists of a porous polymer tube connected to a PVC tube and a Luer-Lock male connector. With each *Micro Sampler,* a cap is supplied to protect the Luer-Lock connector from debris entering the tube.



(Fig. 2) Micro Sampler Parts

Item #	Part #		Description
1.	1908D2.5L10	5	Samplers with Luer-lock Connectors/Protectors
2.	MML075	5	Needles 21G x 1-1/2 (0.8mm x 44mm)
3.	MGL010	5	Glass Vacuum Vial (10ML)

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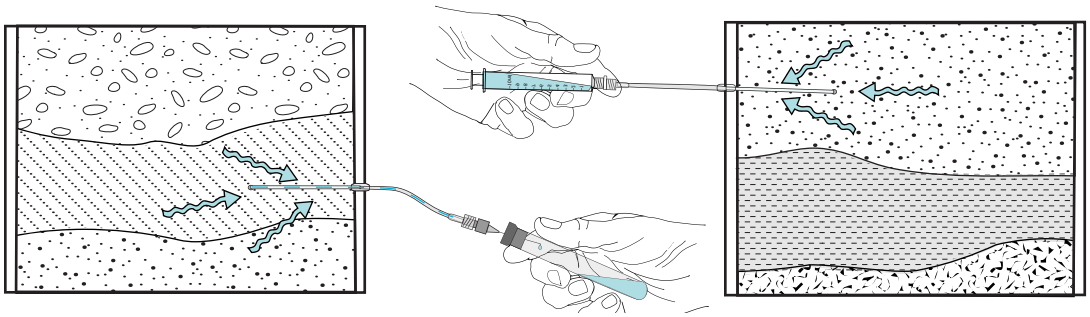
GENERAL SPECIFICATIONS

The porous polymer (and 5 " of the PVC tube) is strengthened internally by a 14 cm long rigid plastic fiber or stainless steel wire. The rigid plastic fiber is connected to the end of the porous polymer. A sample is obtained by connecting a vacuum vial or by creating a from a mating syringe).

- Bubble point > 2 bar (0.2 MPa).
- Yield in water: 1 bar pressure differential: > 1 ml/min. With a 10 ml vacuum tube the yield in soil is typically 7 ml in 1-16 hours (overnight), depending on soil properties.
- Diameter of the porous tube is 2.5 OD x 1.5 ID mm.
- Diameter of the PVC tube is 2.5 OD x 1.0 ID mm.
- Interior volume of porous sampling section 0.14 ml, total interior volume of sampler =.187ml
- Acceptable pH: 3 - 12, also depends on corrosive properties of the soil solution.

THEORY OF OPERATION



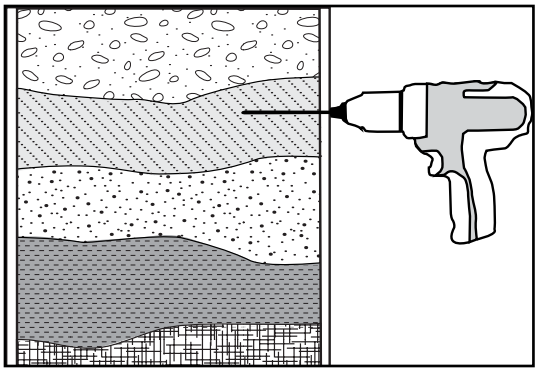
(Fig. 3) Collecting a sample from a soil column

Micro Samplers are designed for potted plants, cylinder and column research. Sampling by micro samplers are appropriate when successive soil moisture samples are needed:

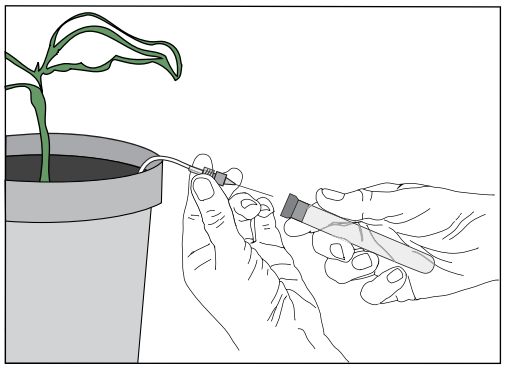
- Models of nutrient root uptake using the actual concentration of nutrient in the soil solution.
- Accumulation and concentration studies in crack and/or fractures
- Mineralization studies.
- Salt accumulation studies.
- Marker detection or sorptivity estimations.

PREPARATION OF THE SOIL MOISTURE MICRO SAMPLERS

Micro Samplers are preferably inserted horizontally in wet soil, because of the limited mechanical strength of the porous material. The water acts as a lubricant. Wet soil will set after a (small) disturbance caused by inserting the sampler. Soil-sampler contact will improve after setting and consequent time needed to extract a given volume will decrease.



(Fig. 4) Drilling a hole in the soil column



(Fig. 5) Inserting the needle in the vacuum tube

EXAMPLE OF "HOW TO INSTALL" and EQUIPMENT NEEDED:
(fig.4)

- -Electric or hand drill (+ depth control).
- -Drill 1/8 (.125") or (3.18mm) in Plastic Tubing (enough to clear epoxy bulb on end)
- -Aluminium line level to assure a perpendicular hole in column
- Stainless steel rod, diameter .100 " or (2.0-2.5 mm), pointed (eg. knitting needle)+ depth control (mark with PVC tape) marking depth of "push" fit for sampler
- Insert wetted micro sampler to previous created push depth in column.
- Vacuum Vial or Syringe 10 ml. to retrieve a sample
- -Water and light resistant marker to mark specific details and hole placement
- -Black PE tube (for drip irrigation etc) 6 x 4 mm, to shield the exposed extension tube to reduce/prevent growth of algae.

HOW TO USE VACUUM VIAL
(fig.5)
Number sample positions and vacuum tubes before sampling. Check the shelf life of the vacuum tubes.

1. Make sure micro sampler is in place and securely held in the sampling media.
2. Replace the protective cap with the Luer-Lock needle from the kit .
3. Jab the needle in the vacuum tube.
4. Wait 1 hour or more, when sample volume is adequate stop sampling.
5. Note down samplers with low/no yield.
6. Wait twice as long and repeat 4.
7. Compare volume and time of sampling.
8. Recap the vacuum tube with the protective cap and store samples dark and cooled.
10. Septums of non-silicon glass tubes are sometimes treated with glycerin. Glycerin may influence nitrate concentrations during storage and will influence the results of (soluble) organic matter determinations.

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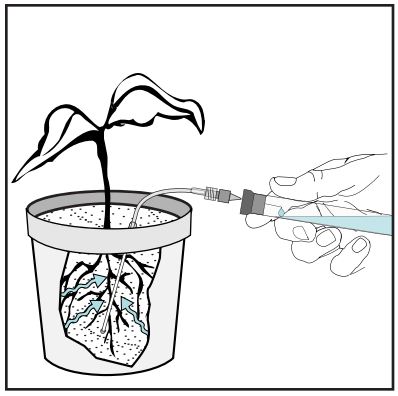
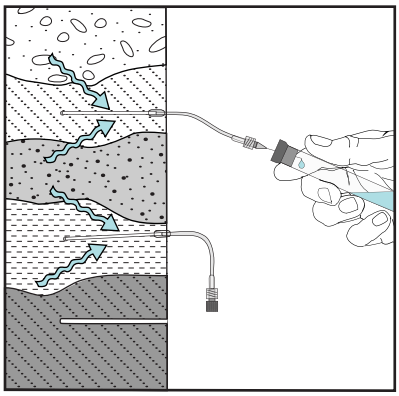
TYPICAL MICRO SAMPLER APPLICATIONS WITH VACUUM VIALS



(Fig. 6) Pot/Container

SAMPLING IN POTS AND CONTAINERS

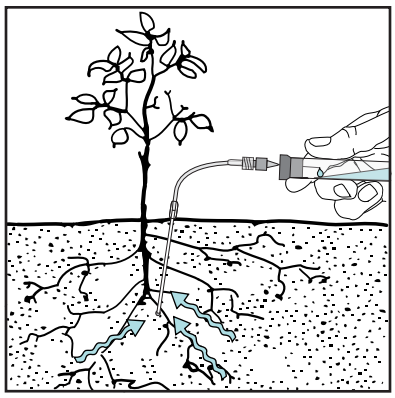
When preparing a pot or container (as shown in Fig.6) for sampling, make sure that the micro sampler is fully covered and that there is access to the extension and when not in use the extension Luer Lock end cap is covered and protected. In general potting environments use loose soil organic mixes and loams which make it easy to install a micro sampler but frequently will not provide adequate contact for unsaturated conditions. It may be good to provide a silica flour blanket around the micro sampler so that a much larger contact area can be achieved in taking a representative sample in this very loose sampling media. This also means that active sampling can only take place near saturation as the pores will empty very quickly at elevated matric suction values.



(Fig. 7) Soil Column

SAMPLING WITHIN SOIL COLUMNS

The most important facet in getting representative samples to assure that soil is compacted at the edge of the holding cylinder so that preferential flow does not develop between soil and cylinder walls (as shown in Fig.7). Since the extension tubes at various heights may not be in use it would be good to cover them with black tubing to prevent possible growth. If removed from the column the access hole can simply be taped over until it's next insertion an sampling session. If you have differing soils within the column with differing flow rate constants "k" you will have differing sample volumes over the same period of time due to those characteristics.



(Fig. 8) Rooting Zone

SAMPLING IN ACTIVE FIELD ROOT ZONES

As with potted plants, you want to assure that the full length of the micro sampler has been placed below the soil surface, (as shown in Fig.8) and that the tube extension end is covered and protected when not in use.

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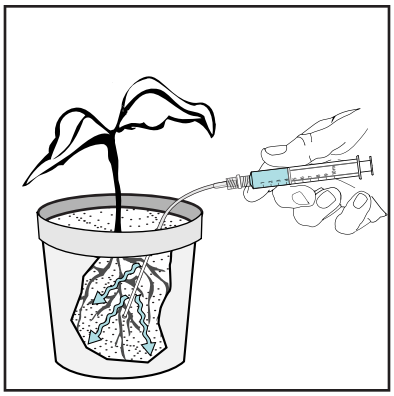
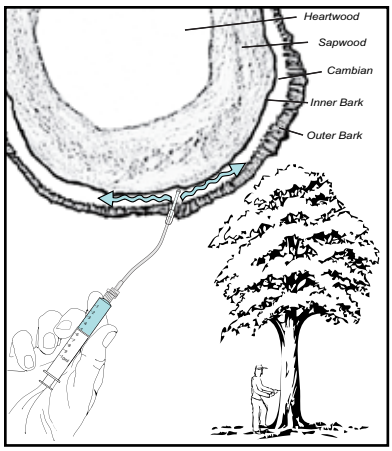


(Fig 9) Injection into the Rooting Zone



(Fig. 10) Liquid Drip Injection

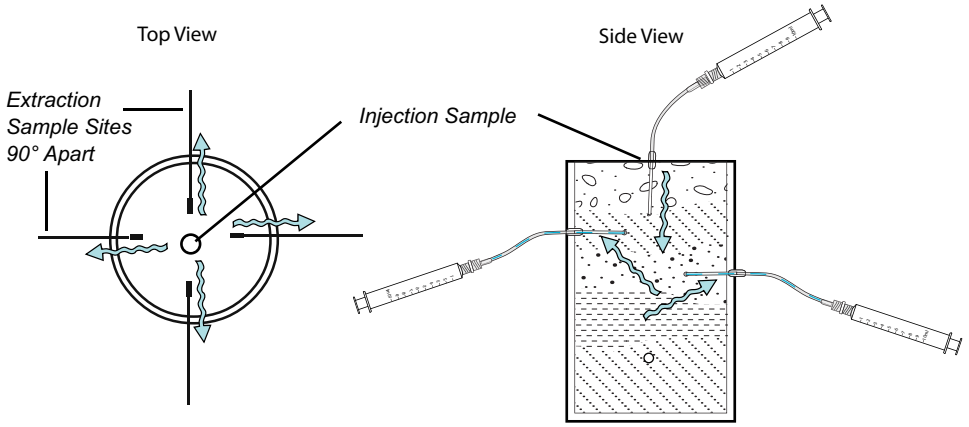
USING THE MICRO SAMPLER FOR INJECTION OF SOLUBLE CONSTITUENTS

Micro Samplers can also be used to introduce soluble liquids *into* a soil or porous media for analysis. Consider the Micro Sampler as somewhat of a point source for the introduction of soluble liquids into plant or rooting uptake or outflow streams.

Since the Micro Sampler represents a convenient size and flexible nature you now have a new and exciting method of introducing soluble elements of interest into a growing environment.

This can be helpful in determining specific specific rooting area sensitivies, sap flow characteristics up and down a plant system, toxicities and a number of other interesting areas of plant / soil relationships.

USING THE MICRO SAMPLER FOR INJECTION AND EXTRACTION



(Fig. 11) Injection and Extraction at the same site

By using Micro Samplers as both a point injection sites and surrounding Micro Samplers for sampling, you can now effectively calibrate flow characteristics of soluble tracers or elements in both a lateral and vertical manner. This allows one to know with certainty, just how flow and uptake occur within a small area. It is very helpful in the rooting of young plants and other bound root conditions.

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MAKING MODIFICATIONS TO YOUR MICRO SAMPLER

In some cases it's not a matter of getting a large sample but getting a very small sample from a very specific area. The Micro Sampler can be modified by careful cutting of the sampler and then sealing the end with approved epoxy we suggest our Model 0980V0.5 1/2 oz. Epoxy Kit for this purpose.

1. Cut the sampler to the desired length with a good sharp wire cutters. If the internal rigid fiber drops out, simply re-insert back into the extension tube. The support fiber is necessary so that the polymer does not collapse during the insertion or sampling process.

2. Dip the shortened sampler assembly into the premixed epoxy slurry to completely cover the sampler end (tip).

3. Let the epoxy harden over night. The modified sampler is now ready to use in it's abbreviated form. Remember with the limited porous surface it will take longer to accomplish a sample or injection process.

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HELPFUL HINTS IN NORMAL USE

When 10% of the Mico Samplers continue to have low yields, it may mean replacement of these samplers or extend wait time. A small tenisometer (like a Model 2100 or Model 2900) can often be used to determine current unstaturated conditions. If tensions are exceeding 50cb of suction there will often be dimished sample volumes. Some days after inserting, as a rule, samplers will yield a larger sample because the soil sets, consequently soil-sampler contact improves in time.

TROUBLESHOOTING

As indicated above Micro Samplers in poor contact will continue to give low sample volumes unless they are re-inserted and must be provided a tight fit once installed. If an impermeable layer was created in the column above the Micro Sampler preventing water flow from reaching the sampler. The Micro Sampler was buried at depth within a dense clay and never allowed to be saturated it will "seal" the sampler in a unresponsive environment not able to withdraw any samples. The same inability to sample will occur in media of large granular particles that only occasionally touch the sampler surface
again preventing any sampling except during saturated or ponding conditions.

ACCESSORY ITEMS AND REPLACEMANT PARTS LIST

Item #	Part #	Description
1.	Z1908D2.5L10Pkg05	5 Samplers with Luer-lock Connector / Protector Cap
2.	Z1908D2.5L10Pkg10	10 Samplers with Luer-lock Connector / Protector Cap
3.	ZMML075	Needles 21G x 1-1/2 (0.8mm x 44mm)
4.	ZMGL010	Glass Vacuum Vial (10ML)
5.	Z0980V0.5	1/2 oz. Epoxy Kit
6.	ZMML002	10CC Syringe
7.	ZMML076	Luer-lock Union

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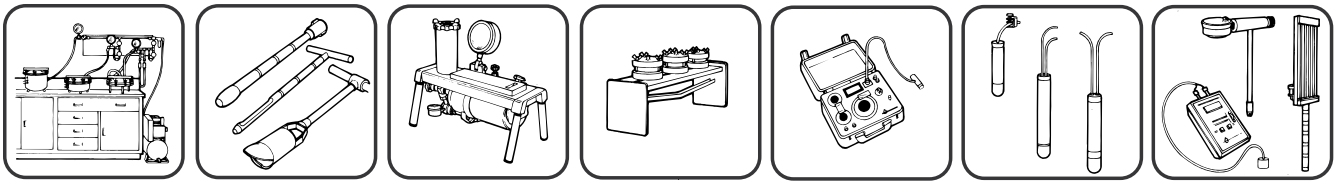

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