1909/1910 QUICK START GUIDE

Simpler Soil Water Samplers 02/2018

Fig. 1 - Model 1910LL

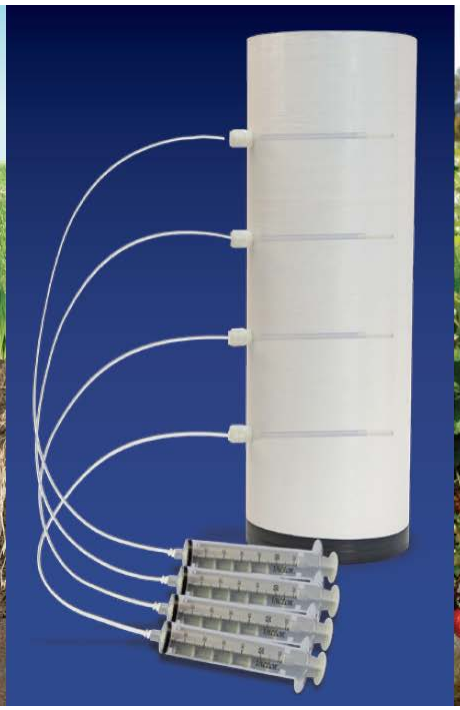

Fig. 2 - Model 1910PL

Fig. 3 - Model 1909L

1910LL## Simpler Luer-Lock Micro Samplers
6, 12, 18, 24, 36, and 48-inch lengths available

1910PL## Simpler Panel-Mount Micro Samplers
6, 12, 18, 24, 36, and 48-inch lengths available

1909L## Simpler Slim Tube Samplers
1, 6, 12, 18, 24, 36, 48, and 60-inch lengths available

SOILMOISTURE EQUIPMENT CORP.
P.O. Box 30025, Santa Barbara, CA 93130 U.S.A.
Phone: (805) 964-3525 – Fax: (805) 683-2189 – Email: sales@soilmoisture.com
Website: http://www.soilmoisture.com

UNPACKING

The 1909/1910 Simpler Samplers were thoroughly tested before shipment. When packed, they were in perfect working order. Unpack with care being sure to remove all packing material. Follow the instructions carefully in order to assure long, trouble-free service.

Any damage found upon receipt should be reported immediately to the transport carrier for claim. It is important to save the shipping container and all evidence to support your claim. Be sure to read all operating instructions thoroughly before operating the unit.

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.

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SPECIFICATIONS

1909L##-B01M3
7/8" O.D. butyrate body with 1/8" O.D. polyethylene inside tubing. 1, 6, 12, 18, 24, 36, 48, and 60 in. lengths available. Ends in female luer connection. Length and ceramic type can be customized.

1910LL##-B01M3
1/4" O.D. FDA-grade vinyl body with 0.094" O.D. hypodermic-quality stainless steel inside tubing. 6, 12, 18, 24, 36, 48, and 60 in. lengths available. Ends in female luer connection. Length and ceramic type can be customized.

1910PL##-B01M3
3/8" O.D. polycarbonate body with 1/8" O.D. polyethylene inside tubing. 6, 12, 18, 24, 36, and 48 in. lengths available. Ends in female luer connection. Includes 3/8" NPT connection to mount. Length and ceramic type can be customized. 1930 60 cc Locking Syringe ends in male luer connection. 4" x 6" Cloth Bag. Complies with ASTM D4696-92(2000), Standard Guide for Pore-Liquid Sampling from the Vadose Zone.

ACQUAINT YOURSELF WITH THE PARTS

The 1909 Simpler Slim Tube Soil Water Sampler is Soilmoisture's newest and most user-friendly near-surface soil water sampler. The 1909 is a "zero dead volume" sampler, meaning that there is limited space for collecting water samples inside the sampler itself. Therefore, Soilmoisture now offers the Model 1930 Locking Syringe. Using the Locking Syringe, users only need to attach the syringe and charge it with vacuum. The Locking Syringe will create 80 cb of vacuum, and will maintain vacuum to collect the sample. This way, when the user returns they simply need to collect the contents of the Locking Syringe, re-apply the vacuum to the sampler, and be on their way! Combining the 1909 with the 1930 Locking Syringe makes pore water sample collection faster and easier than ever before!

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REQUIREMENTS PRIOR TO USE

WETTING THE CERAMIC TIP

It is possible to install the 1909 dry (without below preparation), however, the following procedure is recommended. It is also recommended to discard the first 2 or 3 collected samples.

1. First, the user must collect de-aired water. This can be done using Soilmoisture's De-Aired Water Service Kit (Part 2705K3).
2. Once the user has a jar, pot, or other large collection of de-aired water, remove the plastic cover from the ceramic, but save the plastic wrap and rubber band for later, as you will use them again. Try to avoid touching the ceramic with bare hands.
3. Place the ceramic tip of the sampler into the de-aired water (Fig. 4a). It is imperative to not let the ceramic tip get wet on the inside! If water enters from both sides of the ceramic, air bubbles can be trapped inside the ceramic and the sampler will not work properly.
4. Once the samplers are in de-aired water, connect the 1930 Locking Syringe to each via its luer-lock connection, pull the syringe back, and lock into place (Fig. 4b). This can also be done with other Vacuum Extraction Kits.
5. Leave the samplers and syringes (or other Extraction Kit) to sit overnight.
6. The next day, water should have collected into the Syringe. If so, the ceramic has been properly wetted. If not, check all connections and repeat steps 3-5.
7. Once the ceramic tips have been fully wetted, replace the plastic bag over the ceramic tip securing with the rubber band (Fig. 4c).

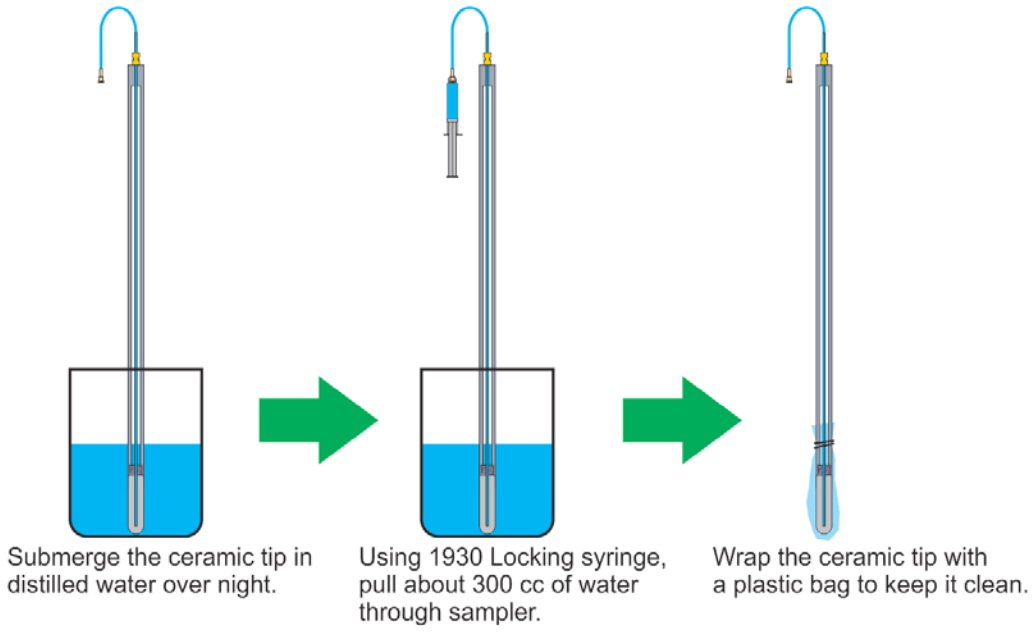

Fig. 4a, b, c - wetting the ceramic tip

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Figure 5. Charging Locking Syringe

A. Connect Locking Syringe to 1909 sampler and then pull the Syringe Handle.

B. Turn the Syringe Handle to lock it in position.

Figure 6. Preparing the 1909 Sampler in the lab.

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INSTALLING THE SAMPLERS

Simple Installation

One of the key features of the Simpler Soil Water Sampler series is the ease of installation. The fastest and easiest way to install the samplers is using the 0240L Insertion Tool (for the 1909L##) or the 1910K2L## (for the 1910LL##) or the 2706L# (for the 1910PL#). In any case, the procedure is the same:

1. Ideally wait for some type of watering event before installation. This makes using the insertion tool easier and allows the ceramic to make a better connection with the soil.
2. Be sure to mark, or otherwise indicate on the Insertion Tool how deep you would like to go.
3. Push the Insertion Tool to the desired depth. Be sure that it is inserted straight (Fig. 7).
4. Remove the Insertion Tool, again being sure that it is straight and steady.
5. Pour a small amount of water into the hole; just enough to wet the area where the ceramic cup will be inserted.
6. (Optional) Attach a Sampler Skirt to the Sampler as a means to prevent preferential flow into the hole.
7. Push in the Simpler Sampler. Be sure to push it all the way in and that it is snug, however do not push past the point of resistance (Fig. 8).
8. (Optional) Place Bentonite pellets around the top of the Sampler to prevent preferential flow into the hole.

NOTE: We recommend covering the Locking Syringe with a cloth bag to protect the collected sample from direct sunlight and dust and to keep it cool. 1909 Samplers can be installed at any orientation (vertical, diagonal or horizontal).

Fig. 7 - Using the 1910K2 Insertion Tool

Fig. 8 - inserting the 1910 Sampler

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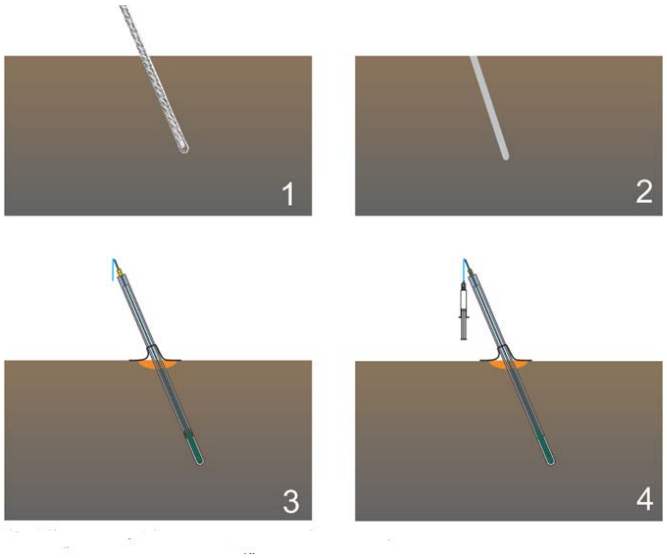
Fig. 9a - Drawing of Simpler Sampler installation process



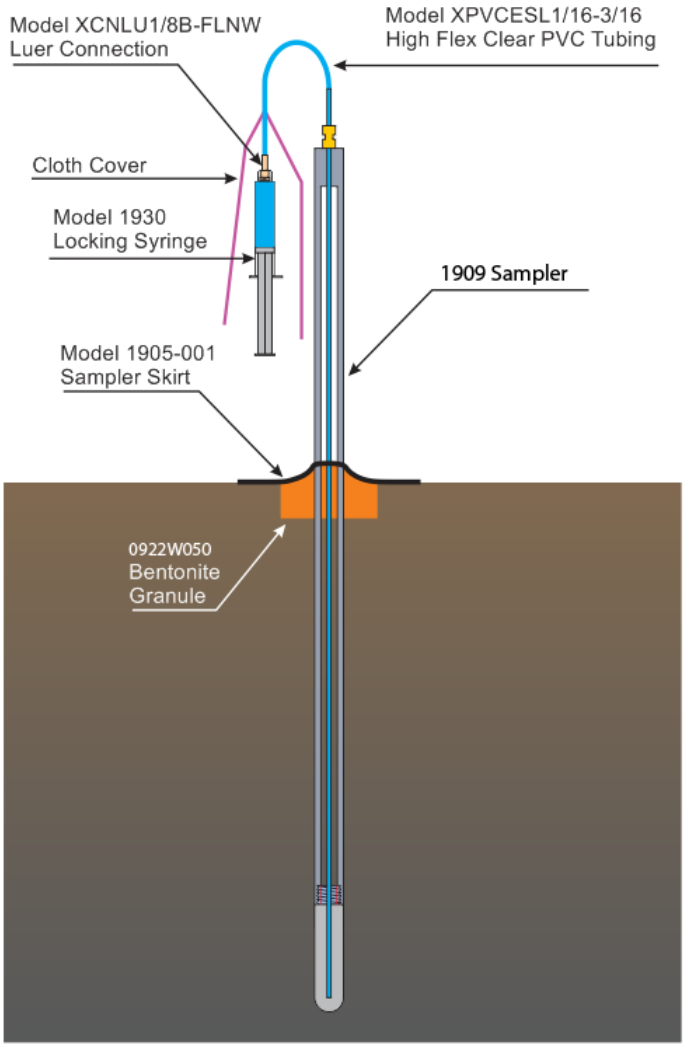


Fig. 9b - Drawing of installed sampler

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Specialized Installation

For some field applications, it may be necessary to install Samplers with Silica Flour and a larger borehole. While given its small size and surface area this is generally not recommended for the 1910 Simpler Micro Sampler series. It may be done with the 1909L Simpler Slim Tube Samplers. For this installation method the user will need an auger (~4 cm diameter recommended), Silica Flour, and Bentonite pellets.

1. Be sure to calculate the amounts of Silica Flour and Bentonite pellets will be required for installation. This can be done using the Silica & Bentonite Calculator available from Soilmoisture's Website.
2. Make a mark on the Auger how far deep you will need to dig. Remember that there will be a layer of Silica Flour between the bottom of the ceramic cup and the bottom of the borehole, so you will want to dig a little deeper than the depth from which you want to sample.
3. To dig the borehole press the tip of the Auger into the ground and turn the handle clockwise. Be sure that the auger is vertically straight as you dig. Try to keep the layers of soil which you are digging organized so they can be backfilled in order.
4. Once the depth mark on your Auger is even with the top of the hole, take the remaining dirt out and discontinue digging.
5. Mix Silica and water based on the calculations made in step 1. We recommend you use a mask when working with Silica Flour or Bentonite to avoid inhaling any particles. **NOTE:** The slurry mix will harden very quickly.
6. Immediately pour the silica slurry into the borehole and insert the Sampler (with plastic cover and rubber band removed) into the borehole. Be sure that the entire exterior of the ceramic cup is in full contact with the Silica slurry.
7. Hold the Sampler in place for a couple of minutes to let the silica slurry harden up. It may be helpful to gently move the Sampler back and forth to expedite this process. Just be sure to not let any of the ceramic leave contact with the silica slurry once it is in place.
8. Pour a layer of Bentonite pellets over the top of the layer of silica. This also will help to solidify the silica slurry.
9. Backfill the remaining parts of the borehole with the native soils. Try as best as possible to keep the vertical horizons of the soil intact.
10. On the top layer (~1 inch or so), place bentonite pellets around the borehole opening to prevent preferential flow into the borehole.

(*) Please see Soilmoisture's YouTube channel for instructional videos on this installation method (https://www.youtube.com/user/Soilsales).

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SAMPLE EXTRACTION

Simple Extraction

For the majority of applications, the 1930 Lock & Load Syringe Extrac-tion Kit is the ideal tool for applying vacuum and collecting a sample. The locking vacuum syringe connects directly to the Sampler via the Luer-Lock Connection, or from several feet away using the 1909K1 Luer Extension Kit. The steps in either case are as follows:

1. (If for outdoor use) Cut a small hole in one corner of the cloth bag and place over the Syringe so the tip of the Syringe can be inserted into the cloth bag.
2. Connect the Syringe to the Sampler via the Luer-Lock Connection.
3. Pull the syringe open, and twist to lock into place (Fig. 10).
4. (If using the cloth bag) Pull the strings and tie them so that the bag covers the entire clear part of the Syringe.
5. Leave the Syringe in this state for several hours to days, depending on the application (Fig. 11).
6. Return and check to see if the Syringe has collected a water sample (*).
7. Remove the Syringe and inject the collected Sample into a collection vessel, transport the Sample via the Syringe, and/or add a new Syringe, depending on your study's requirements.
8. Repeat steps 1 through 7 as your analysis requires.

(*) *The ability to collect a soil water sample depends heavily on the moisture conditions of the soil. The Locking Syringe can create up to 80 cb of vacuum, so in soils with a matrix potential at or close to this level, it will be very difficult to collect a substantial sample. Soilmoisture's Pencil Tensiometer is a great tool for general estimation of the matrix potential in the soil. This can be installed discreetly near to the Sampler. If the matrix suction shows that the soil is fairly wet (i.e. at or below 40 cb for most soil types), and there still is no sample collected, move on to the steps in the "Troubleshooting" section at the end of these instructions.*

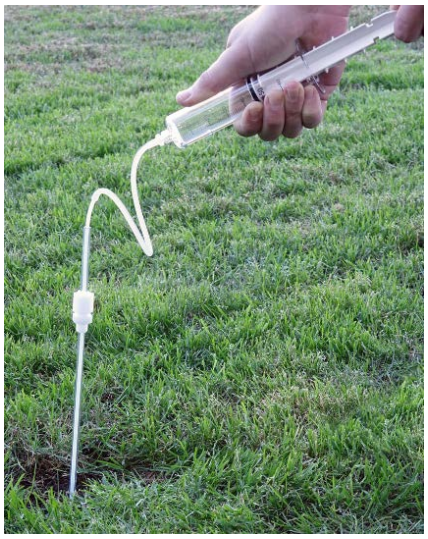

Fig. 10 - Pulling a vacuum with the 1930 Vacuum Syringe

Fig. 11 - Syringe collecting a sample (NOTE: The Cloth Bag should be used for outdoor applications.

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Extracting a Larger Volume

For applications requiring a sample larger than 50 ml, we recommend the 1900K3 Erlenmeyer Extraction Kit for sample collection (see the Accessories section for system options). This Kit will require a Vacuum Hand Pump or other vacuum source. This extraction procedure can be performed as follows:

1. Connect the top of the Sampler to the Erlenmeyer Flask via the Luer-Lock connections and tubing provided with the Extraction Kit (Fig. 12).
2. Connect the Vacuum Hand Pump to the side port on the Erlenmeyer Flask using the black EPDM tubing provided in the Kit. Apply at least 80 cb of vacuum (Fig. 13).
3. While the Vacuum Hand Pump is still connected with vacuum applied, close the EPDM tubing with a Clamping Ring. Then the Vacuum Hand Pump can be removed without losing vacuum (Fig. 14).
4. Let the Extraction Kit sit in this state for several hours to days, depending on the application.
5. Return and check to see if the Flask has collected a water sample.**
6. Either move the collected sample to a new collection vessel, transport the sample via the Erlenmeyer Flask, and/or add a new Erlenmeyer Extraction Flask depending on your study's requirements.
7. Repeat steps 1 through 6 as your analysis requires.

(**) The ability to collect a soil water sample depends heavily on the moisture conditions of the soil. The Extraction Kits hold about 80 cb of vacuum, so in soils with matrix potential at or close to this level, it will be very difficult to collect a substantial sample. Soilmoisture's Pencil Tensiometer is a great tool for general estimation of the matrix potential in the soil. This can be installed discreetly near to the Sampler. If the matrix suction shows that the soil is fairly wet (i.e. at or below 40 cb for most soil types), move on to the steps in the "Troubleshooting" section.

Fig. 12 - Connect the Sampler to the Erlenmeyer Flask.

Fig. 13 - Apply 80 cb of vacuum using the Vacuum Hand Pump

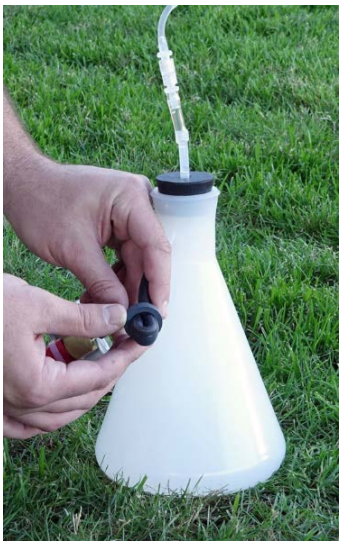

Fig. 13 - Close off the EDPM Tubing before disconnecting the Hand Pump

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TROUBLESHOOTING

Occasionally users may run into the problem that the sampler and/or extraction kit become unable to hold vacuum and collect a sample. This will be evident when a water sample cannot be collected despite clearly wet conditions (i.e. matrix potential equal to 40 cb or less for most soils).

Check Vacuum Source and Connections

The first thing the user should check is if the extraction kit and connections can successfully hold vacuum. This can be done by feel however is more effective if done using a vacuum gauge. Connect the syringe and tubing to a closed collecting jar with a vacuum gauge attached. Pull back the syringe and check to see that the vacuum gauge is reading close to 80 cb. If it is not able to, feel for where there may be an air leak. If the syringe and connections are clearly holding vacuum, then move on to re-wetting the ceramic.

When using the Erlenmeyer extraction kits this is straight forward as the pump includes a vacuum gauge to let you know how much vacuum is being held. If after a period under vacuum and fairly wet conditions the kit has not collected a sample, connect the vacuum hand pump to the flask via the EPDM tubing, and then remove the clamping ring and note how much vacuum is being held. If no or very little vacuum charge remains in the collection kit, re-apply vacuum and check if it is being held in the flask. If not, there may be an air leak somewhere in the system which you should try to feel for. If the flask is holding vacuum when initially applying it, or there does not seem to be any air leak in the connections, move on to re-wetting the ceramic.

Re-wetting the Ceramic In-situ.

To rewet the ceramic while the sampler remains installed in the soil, simply collect de-aired water into a syringe and push it into the sampler to flow through and out of the ceramic. After this, remove the syringe and leave the sampler open for several minutes to hours to allow the water to move into the soil. After this, apply vacuum once again and see if you can collect a sample. The conditions should be wet if water had just been applied through the ceramic (this can be verified using a tensiometer). After this waiting period, re-connect the extraction kit and collect a sample. If a sample can be collected then everything should be OK. If not then it is time to remove the sampler.

Removing Samplers & Re-wetting the Ceramic

The final test for a malfunctioning sampler is to remove it and re-wet it repeating the steps in the “Requirements Prior to Use” section. If the sampler is able to collect water in this state then it likely was the connection between the ceramic and soil that had made sample collection not possible, which requires re-installation. If water still cannot be collected through the ceramic, then this procedure may reveal where there could be a leak in the sampler. Otherwise it may just be necessary to replace the sampler.

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Replacement Parts and Accessories

0240L30	7/8" Insertion Tool, 30" Length
0240L54	7/8" Insertion Tool, 54" Length
0240L78	7/8" Insertion Tool, 78" Length
1910K2L12	Insertion Tool for 1910LL Samplers, 12-inch length
1910K2L24	Insertion Tool for 1910LL Samplers, 24-inch length
1905-001	Sampler Skirt
1930	60 cc Locking Syringe
1900K3	Erlenmeyer Extraction Kit, 1 Liter
1900K3-2L	Erlenmeyer Extraction Kit, 2 Liter
1900K3-4L	Erlenmeyer Extraction Kit, 4 Liter
1900K4	Erlenmeyer Extraction Kit, 1 Liter, with Case & Vacuum Hand Pump
2005G2	Vacuum Hand Pump
1909K1	Extension/Luer/Tubing Kit
XCNLU1/8B-FLNW	1/8 Barbed to Female Luer Fitting
XPVCESL1/16-3/16	1/16 ID, High Flex Clear PVC Tubing
MZT032	1/8" Polyethlene Tubing
0922W050	Bentonite Clay Granules, 50 lb. bag
0930W050	200 Mesh Silica Flour, 50 lb. bag
2706L12	3/8" Insertion Tool for 1910PL, 12-inch size
2706L24	3/8" Insertion Tool for 1910PL, 24-inch size

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