

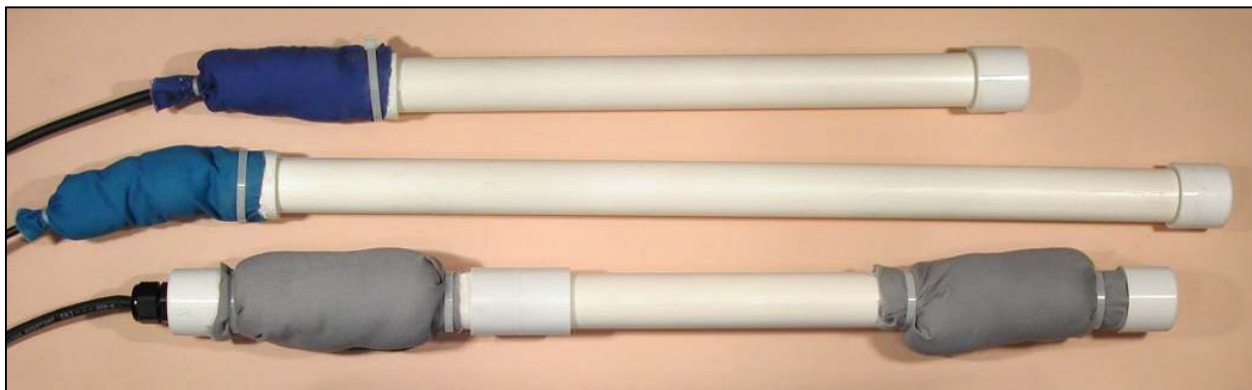
SlimLine[™] Reduced Diameter Reference Electrode

Typical Applications:

- Underground and aboveground storage tanks, buried pipelines, elevator shafts

Featuring:

- 30 or 50 year design life with EDI's LongLife[™] gelled element
- Can be installed in a 2 inch (5 cm) diameter hole



Reduced diameter underground reference electrodes were developed to simplify the installation of permanent underground electrodes in congested locations. They can be installed in a 5 cm (2 inch) diameter bore hole which makes them ideal for retrofit installations beneath paved surfaces. Since these electrodes weigh about one fifth as much as standard bagged electrodes, they are favored when product shipping costs are an important consideration.

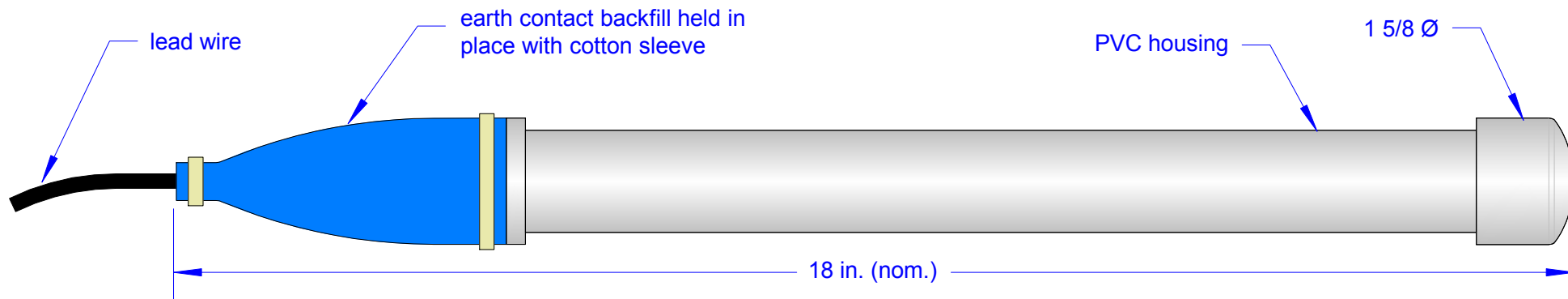
The internal construction and life extension features on reduced diameter reference electrodes are similar to those used for our bagged electrodes with similar design lives. Rather than packaging the entire electrode in a cotton bag filled with bentonite-gypsum backfill, a smaller bag containing this backfill is fitted over the membrane. Since the entire surface of this flexible bag is the earth contact area, this design has lower contact resistance to ground.

Reduced diameter electrodes are easily installed at new construction sites where there is an open excavation or in a small diameter bore hole for retrofitting. After the electrode has been placed in the hole, it is covered with about 5 cm (2 inches) screened local backfill and then saturated with about 8 liters (2 gallons) potable water to activate it. Improved performance can be obtained by adding about 20 percent bentonite to the screened backfill. The potential of the electrode should be checked against a portable electrode of known accuracy before the hole is backfilled.

EDI's SlimLine[™] Reference Electrode (**Model US**) has a 30 year design life and is considered to be the premium reference electrode for all underground installations in congested areas. We also offer an Extended Life version (**Model US50**) with a 50 year design life for projects where a longer service life is required. A rod coupon can be attached to Model US or US50 electrodes if specified at time of order. For installation beneath an above ground storage tank, some design engineers prefer using our Dual Element Reference Electrode (**Model UD**). This model has a 30 year design life Cu/CuSO₄ (or Ag/AgCl) element along with an encapsulated zinc element. The zinc element is replaced with platinum for higher temperature applications (**Model UDH**).

electrochemical devices, inc.

***U Series
Underground
Reference
Electrodes***



Model US - 30 year (nom.) design life

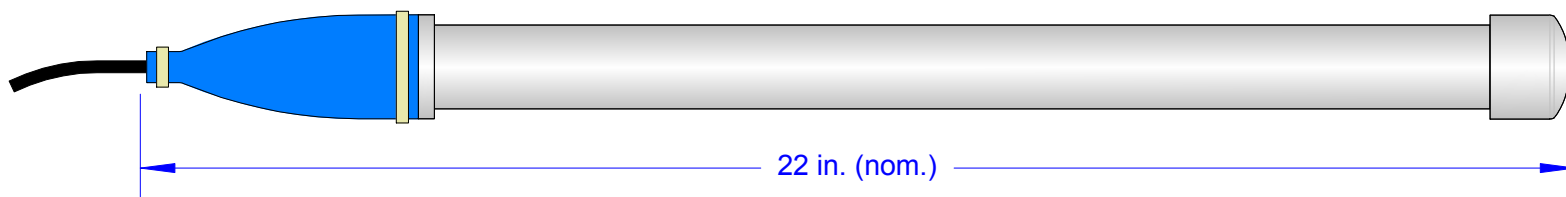
Specify as EDI Model US-xxx-yy where xxx is element type and yy is termination type
Scale 1:2

Element types

AGG = Ag/AgCl (saturated, gelled)
CUG = Cu/CuSO4 (saturated gelled)

Termination types

SW = 50 feet #14 AWG HMWPE lead wire
LWnnn = nnn feet #14 AWG HMWPE lead wire
CW = length and type of lead wire as specified



Model US50 - 50 year (nom.) design life

Specify as EDI Model US50-xxx-yy where xxx is element type and yy is termination type
Scale 1:3

Installation

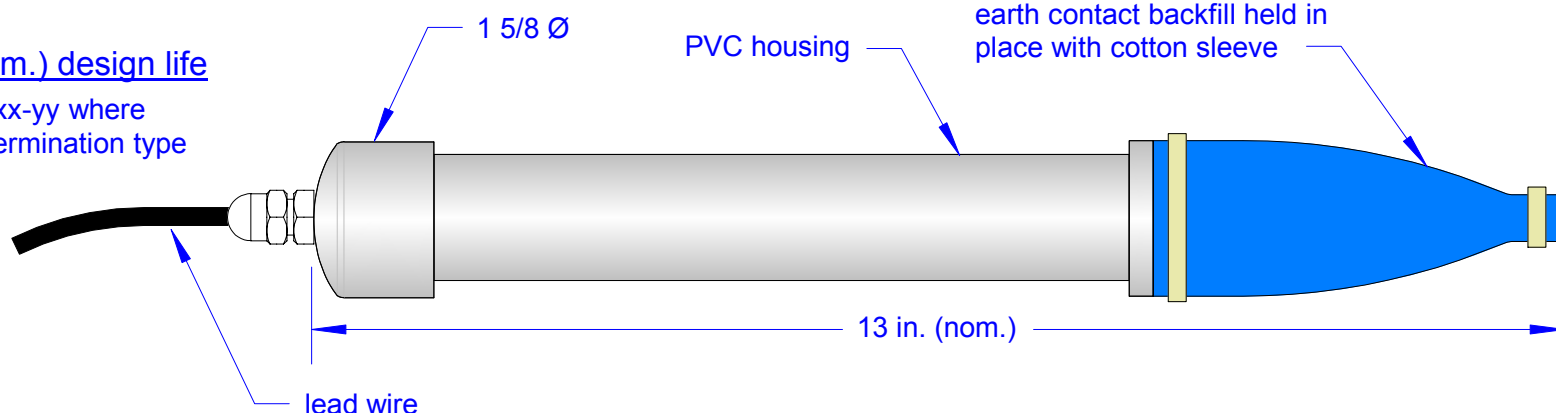
Reduced diameter reference electrodes can be installed in a 2 inch (min.) diameter hole. The electrode is lowered into the hole. A slurry is prepared consisting of 75% sand 25% bentonite clay and enough potable water to make it pourable. Pour the slurry into the hole so that it covers the cotton bag by at least an inch. Measure and record the potential of the electrode with a recently calibrated portable reference electrode.



SlimLine™ Reduced Diameter Reference Electrodes

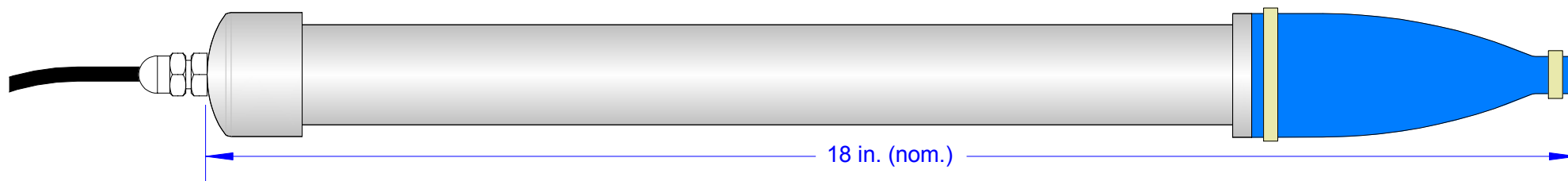
Model USR1 - 12 year (nom.) design life

Specify as EDI Model USR1-xxx-yy where xxx is element type and yy is termination type



Model USR3 - 30 year (nom.) design life

Specify as EDI Model USR3-xxx-yy where xxx is element type and yy is termination type



Element types

AGG = Ag/AgCl (saturated, gelled)
CUG = Cu/CuSO₄ (saturated gelled)

Termination types

SW = 50 feet #14 AWG HMWPE lead wire
LWnnn = nnn feet #14 AWG HMWPE lead wire
CW = length and type of lead wire as specified

Model USR SlimLine reference electrodes are the same as Model US SlimLine reference electrodes except that the wire exits from the opposite end of the earth contact bag. This design may be preferred for certain installation situations.

Installation

Reduced diameter reference electrodes can be installed in a 2 inch (min.) diameter hole. The electrode is lowered into the hole. A slurry is prepared consisting of 75% sand 25% bentonite clay and enough potable water to make it pourable. Pour the slurry into the hole so that it covers the cotton bag by at least an inch. Measure and record the potential of the electrode with a recently calibrated portable reference electrode.



SlimLine™ Reduced Diameter Reference Electrodes

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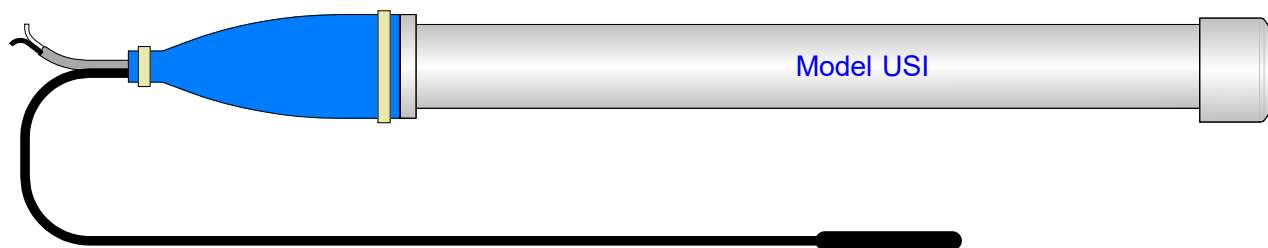
SCALE 1:2

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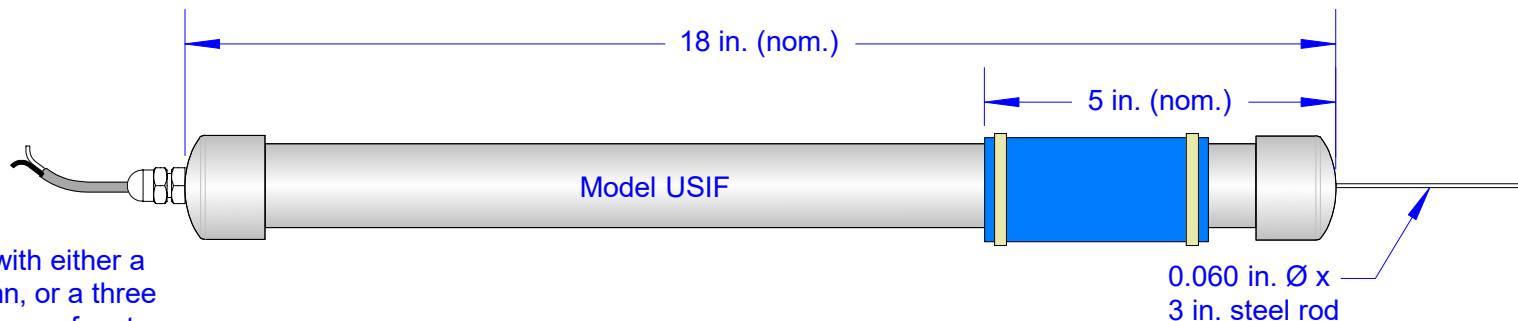
DATE 29 JUN 2015

DRAWING NUMBER US-4

Model UI Instant Off Sensor is a 1/8 in Ø x 2 in (3 mm Ø x 50 mm) steel rod permanently attached to the reference electrode through a #14 RHW/USE2 wire. It can be added to either our US or US50 underground reference electrodes. It is specified by the addition of the letter I to the first group of the model number (e.g. US becomes USI). Other dimensions and features of the reference electrode are as shown on the respective data sheets or drawings.



Model USIF (shown on right) has the coupon attached to the electrode. Earth contact is through the sidewall. This design simplifies installation in a bore hole.



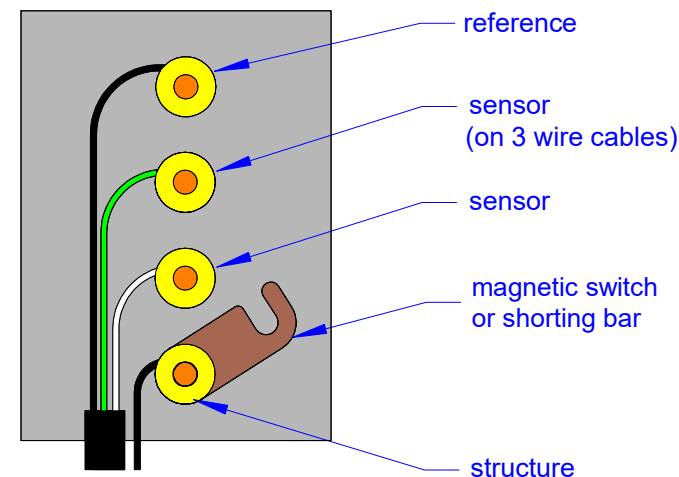
The electrode can be terminated with either a two wire cable, specified as 2Wnnn, or a three wire cable, specified as 3Wnnn. nnn refers to the cable length in feet. Both two and three wire cables have #16 conductors wires: black wire connects to the reference, white wire connects to the sensor, green wire on three conductor cables is also connected to the sensor.

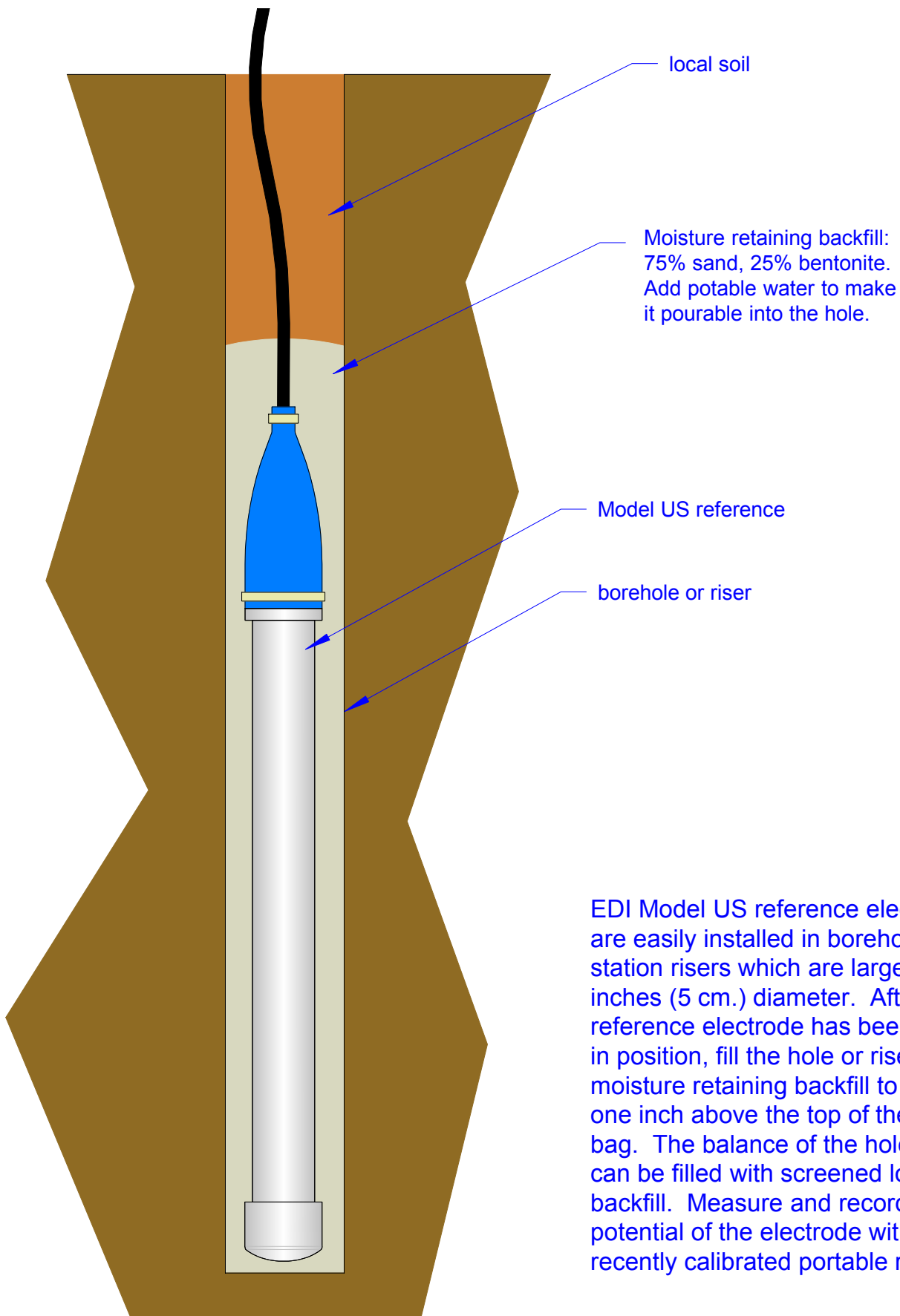
Install by placing the reference electrode as directed; the sensor should be surrounded by the same backfill as the structure. The sensor is pressed into undisturbed backfill within 6 inches (15 cm) of the cotton bag on the reference.

Make regular potential measurements between the reference and the sensor with the shorting bar closed. Make instant-disconnect measurements between the reference and the sensor as the shorting bar is opened.

This sensor can also be used as the working electrode for a three electrode linear polarization test, or as one electrode for semi-quantitative resistivity measurements on soil between the electrode and structure.

Note: A magnet operated switch such as EDI Model SM can be used to simplify making instant-disconnect measurements.





EDI Model US reference electrodes are easily installed in boreholes or test station risers which are larger than 2 inches (5 cm.) diameter. After the reference electrode has been placed in position, fill the hole or riser with a moisture retaining backfill to at least one inch above the top of the cotton bag. The balance of the hole or riser can be filled with screened local backfill. Measure and record the potential of the electrode with a recently calibrated portable reference.

Vertical Installation of Reduced Diameter References

SCALE 1:3

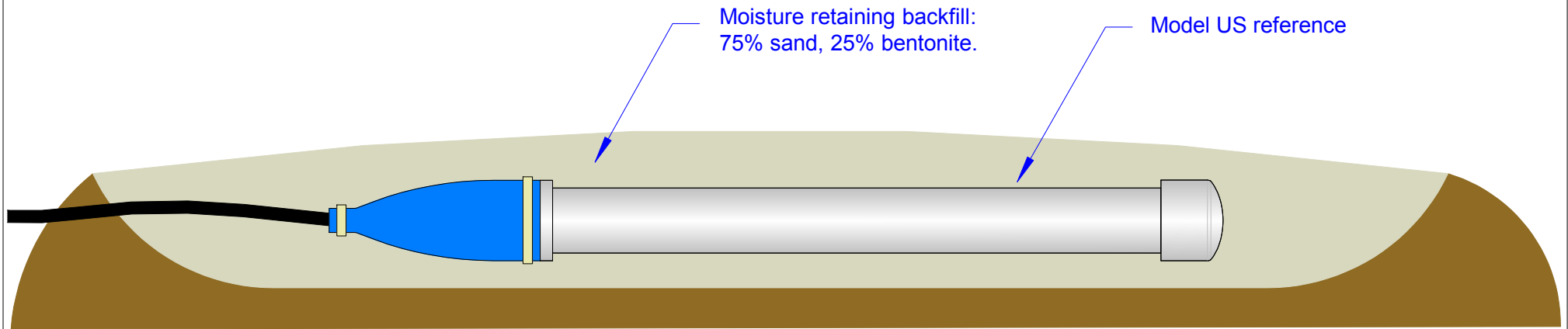
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DATE 30 JUN 2015

DRAWING NUMBER US-6





When installing a Model US reference electrode in a horizontal position, best performance will result if the electrode is placed in a small cavity in the soil. Once the electrode is positioned, cover it with at least an inch of a moisture retaining backfill. Thoroughly wet the backfill with potable water. Measure and record the potential using a recently calibrated portable reference electrode.



Horizontal Installation of Reduced Diameter References

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SCALE 1:3

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DATE 30 JUN 2015

DRAWING NUMBER US-7

Model UD is suitable for use at temperatures up to 120°F
 For higher temperatures, use Model UDH.

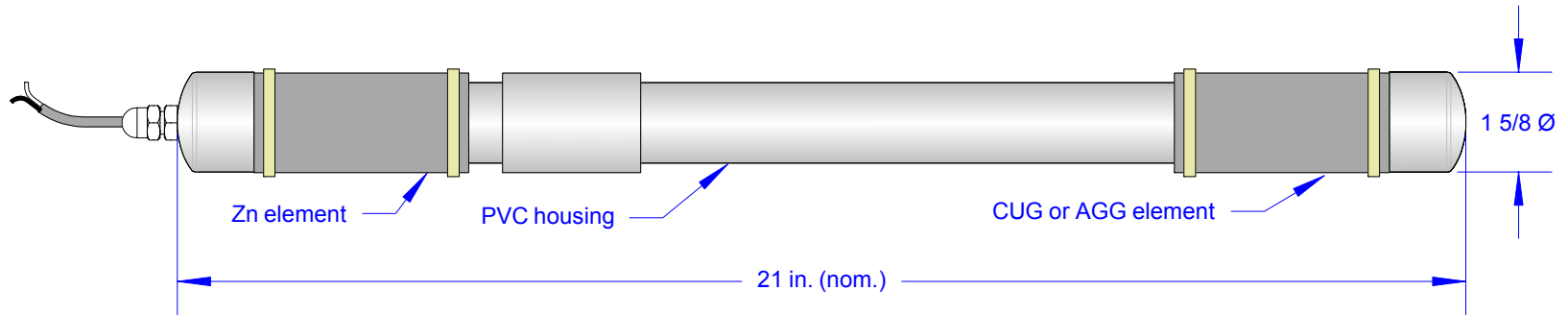
Specify as EDI Model UD-xxx-LWnnn where
 xxx = element type and nnn = cable length in feet

Element types

AGG = Ag/AgCl (saturated, gelled)
 CUG = Cu/CuSO4 (saturated, gelled)

Termination

LWnnn = nnn feet lead wire
 2 conductor cable, #16 AWG
 Neoprene jacket, not shielded
 White wire to zinc or platinum element
 Black wire to Cu/CuSO4 or Ag/AgCl element



Model UDH is limited to a maximum service temperature of 200°F.
 When it is used beneath a storage tank containing heated product,
 it should be buried deep enough so that the temperature at the
 electrode is less than 200°F.

Specify as EDI Model UDH-xxx-LWnnn where
 xxx = element type and nnn = cable length in feet

Conventional Cu/CuSO4 and Ag/AgCl references have a
 reduced life expectancy at elevated temperatures. The platinum
 element on the model UDH should be calibrated against the
 other element during the period when both are functioning
 properly. Once the other element has stopped working reliably,
 readings can continue to be made with the platinum element.

