



METER

DEGASSING WITH SYRINGES APPLICATION NOTE

PURPOSE OF THIS APPLICATION NOTE

This application note covers:

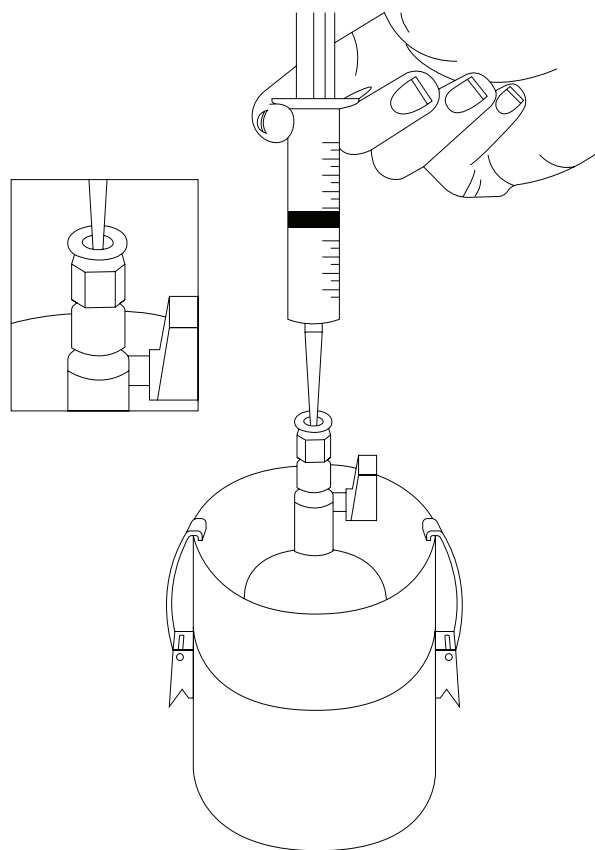
- Degassing water with syringes
- Degassing tensiometers with syringes
- Degassing the HYPROP with adapter and syringes

The Refill Unit is recommended because the process is automated, fast, and reliable. Refer to the HYPROP user manual for using the Refill Unit. When a Refill Unit isn't available, syringes can be used to degas the water. This application note provides the steps for degassing with syringes when the Refill Unit isn't available.

NOTE: It is recommended to begin device preparations as soon as possible once soil samples are available due to the time needed for degassing water.

MATERIALS NEEDED

- Droplet syringe
- Reservoir syringe
- Vacuum syringe
- Tensiometer shafts
- Refiling adapter
- HYPROP
- Tubing (size) 6 mm
- Gloves or rubber caps for tensiometer shafts
- 2 O-rings
- Computer with LABROS SoilView software



Syringe, refilling adapter, and HYPROP

⚠ PRECAUTIONS

Avoid touching the ceramic tips of the tensiometer shafts.

Be sure that no water can enter the shaft from the open end. If water enters the shaft from the open end, air will be locked in the pores of the ceramic tip, preventing accurate readings.

TENSIOMETER SHAFTS

Before degassing water, place the ceramic tips of the tensiometer shafts in deionized water overnight (Figure 1).

The porous ceramic tip enables the degassed water in the tensiometer shafts and the water in the soil to connect. The measured matric potential (also called tension) is transduced by the water down to the pressure transducer's location in the sensor unit.

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DEGASSING WITH SYRINGES APPLICATION NOTE

To ensure the pressure is transduced precisely, the water must be air-free. Follow the steps described in this application note to degas water in the tensiometer shafts and the sensor unit.

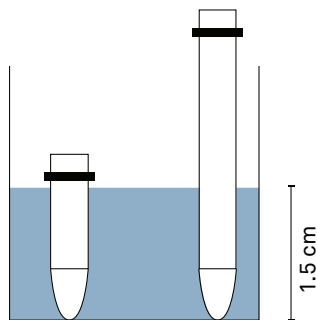


Figure 1 Saturate ceramic tips overnight before degassing

DEGASSING WATER

1. Fill the reservoir syringe with 10 mL of deionized water (Figure 2).

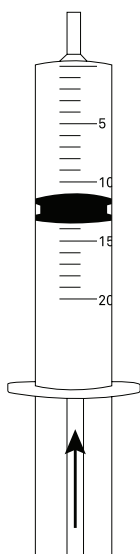


Figure 2 Fill syringe reservoir

2. Cover the tip of the reservoir syringe with finger to seal it (Figure 3)

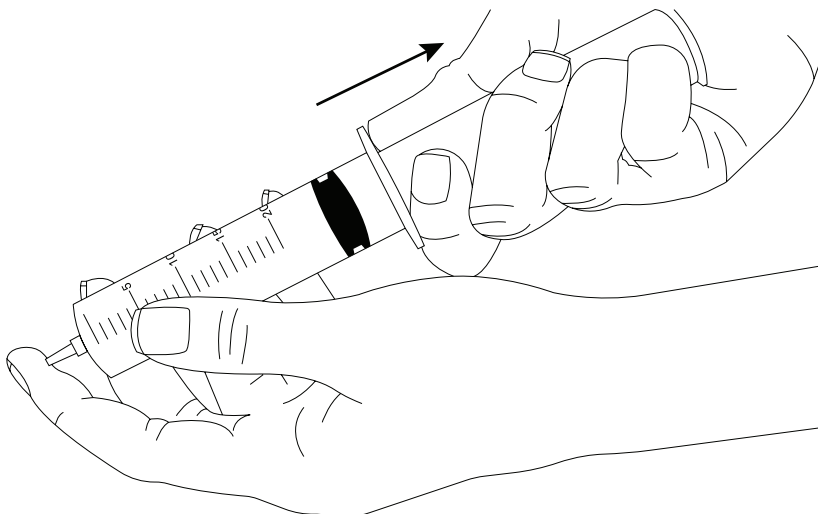


Figure 3 Degassing water in reservoir syringe

3. Keeping the tip covered, turn the syringe so the covered tip is pointing up and remove residual air.
4. Pull the plunger out to create a vacuum, continuing to cover the tip of the syringe (Figure 3). The vacuum in the syringe degasses the water. Air bubbles appearing indicate that the vacuum is achieved.
5. Shake and tilt the reservoir syringe to collect the air bubbles appearing at the inner surface of the syringe (Figure 4).
6. Repeat [step 3](#) through [step 5](#) until no more air bubbles appear.

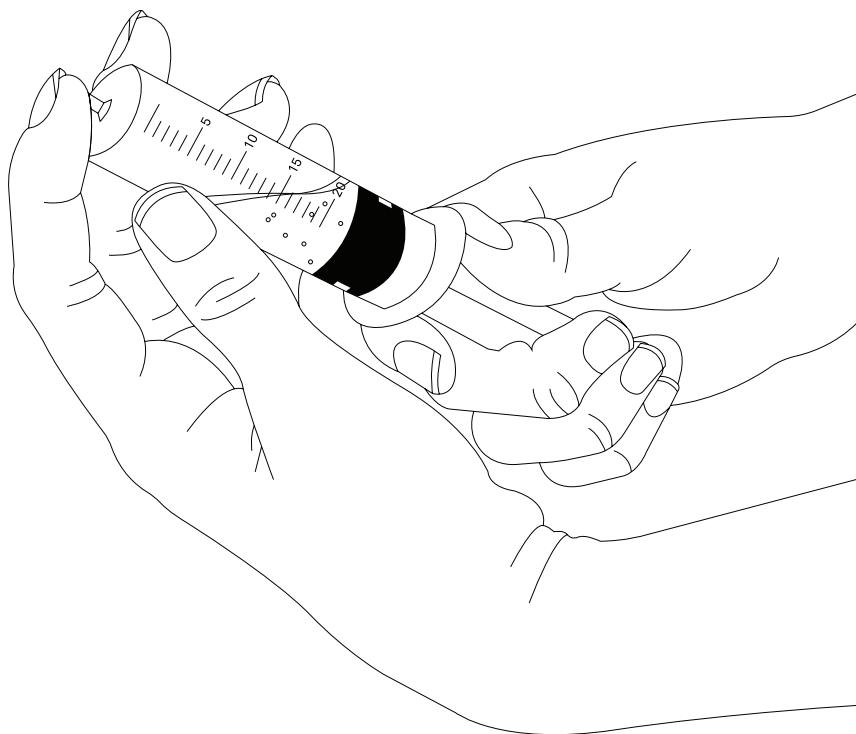


Figure 4 Collecting air bubbles

DEGASSING THE TENSIO METER SHAFTS

1. Push the tube piece on the tip of the syringe.
2. Push the syringe's plunger until a meniscus builds up on the tube piece (Figure 5).

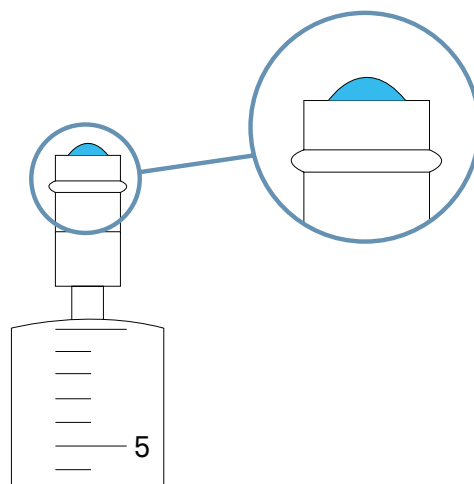


Figure 5 Build a meniscus

3. Push the ceramic tip of the first tensiometer shaft into the tube piece (Figure 6).

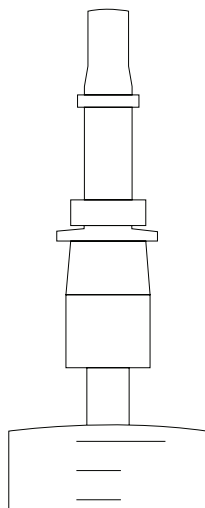


Figure 6 Insert tensiometer shaft

4. Fill the vacuum syringe with 5 to 10 mL of deionized water.
5. Turn the vacuum syringe to point the tip up and remove residual air (Figure 7).

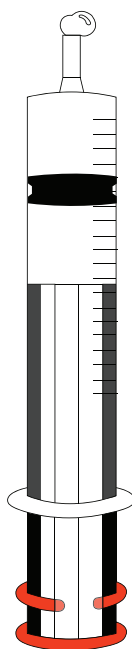


Figure 7 Fill the vacuum syringe

6. Degas the water in the vacuum syringe following steps 3 through 5 (degassing process for the reservoir syringe).
7. Push the tube piece over the tip of the syringe.
8. Push the syringe's plunger until a meniscus builds up on the tube piece.
9. Connect the two syringes and the tensiometer shaft (Figure 8).
10. The two O-rings seal the tubes against the tensiometer shaft.

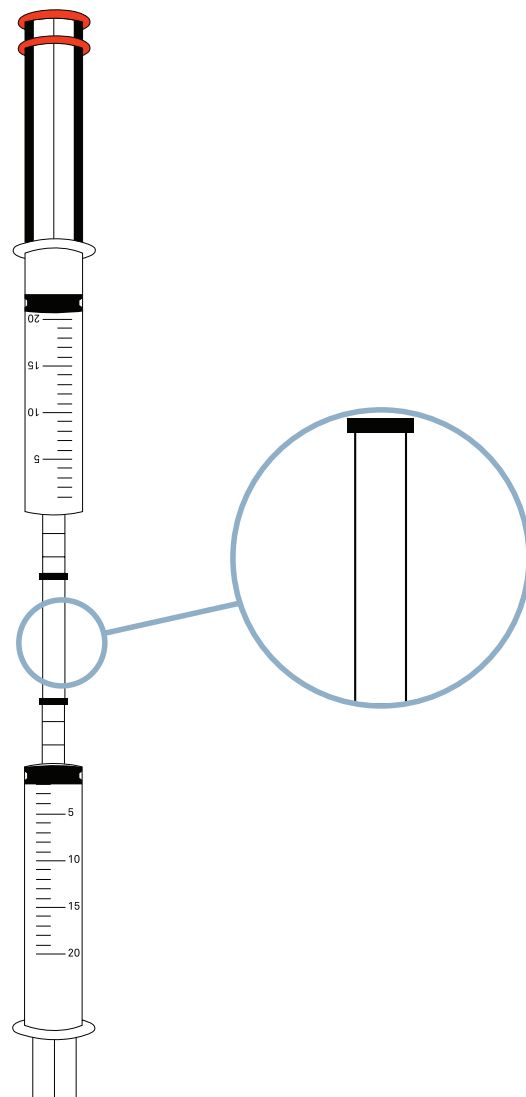


Figure 8 Connect the syringes

11. Pull on the plunger of the vacuum syringe until the end of the plunger meets the plunger stoppers and snaps (Figure 9).

The vacuum in the syringe degasses the water in the tensiometer shaft.

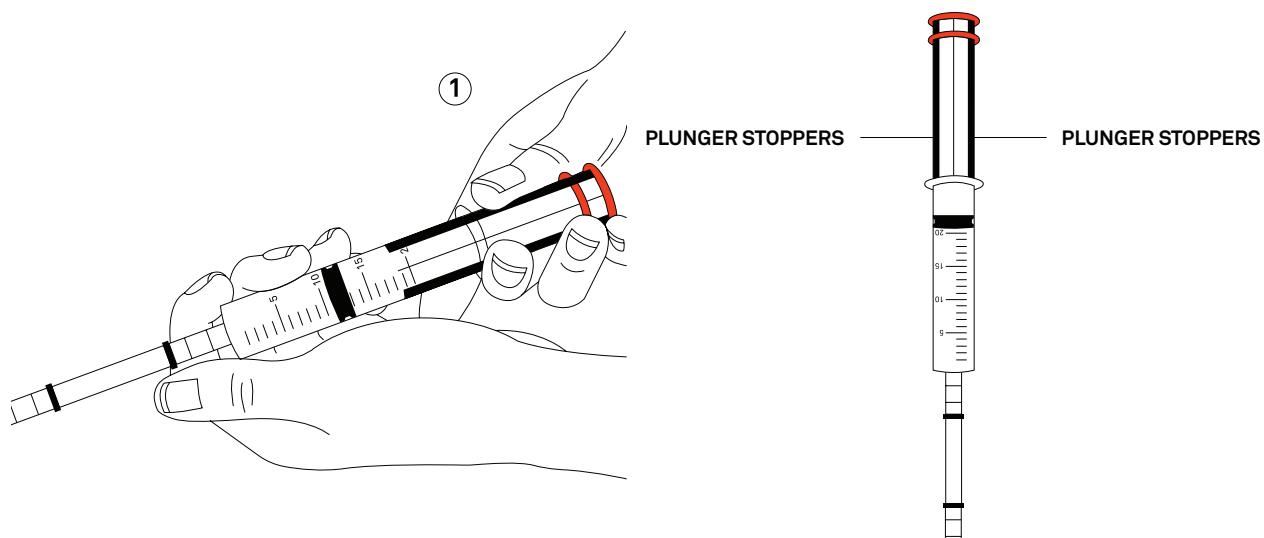


Figure 9 Let the plunger stoppers snap

12. Press the plunger stoppers in to allow the plunger to move, then let the plunger slowly move forward (Figure 10).

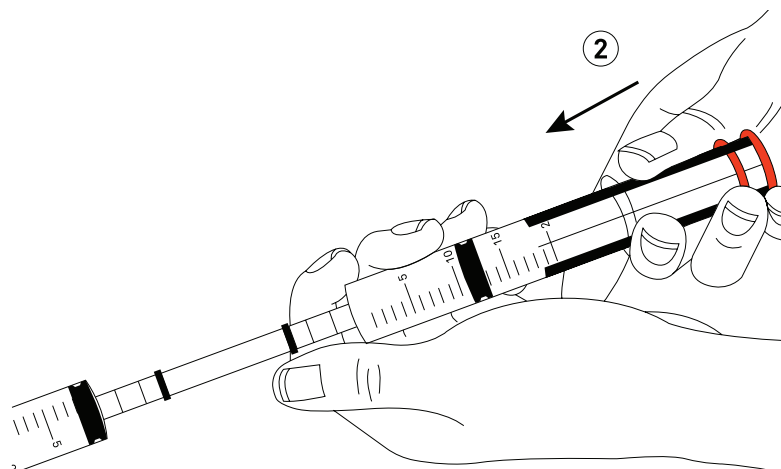


Figure 10 Release the plunger

13. Remove the vacuum syringe, turn the tip facing up, and remove residual air (Figure 11).

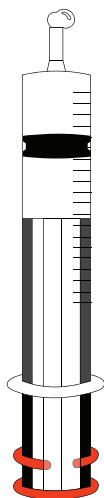


Figure 11 Remove air

14. Again, push the vacuum syringe bubble free onto the tensiometer shaft.
15. Degas the water in the second tensiometer shaft, performing steps 3-5 until no more air bubbles are visible.

DEGASSING THE HYPROP

1. Fill the holes of the HYPROP sensor unit with deionized water using the droplet syringe (Figure 12). Be sure there are no bubbles as you fill the HYPROP sensor tensiometer shaft holes.

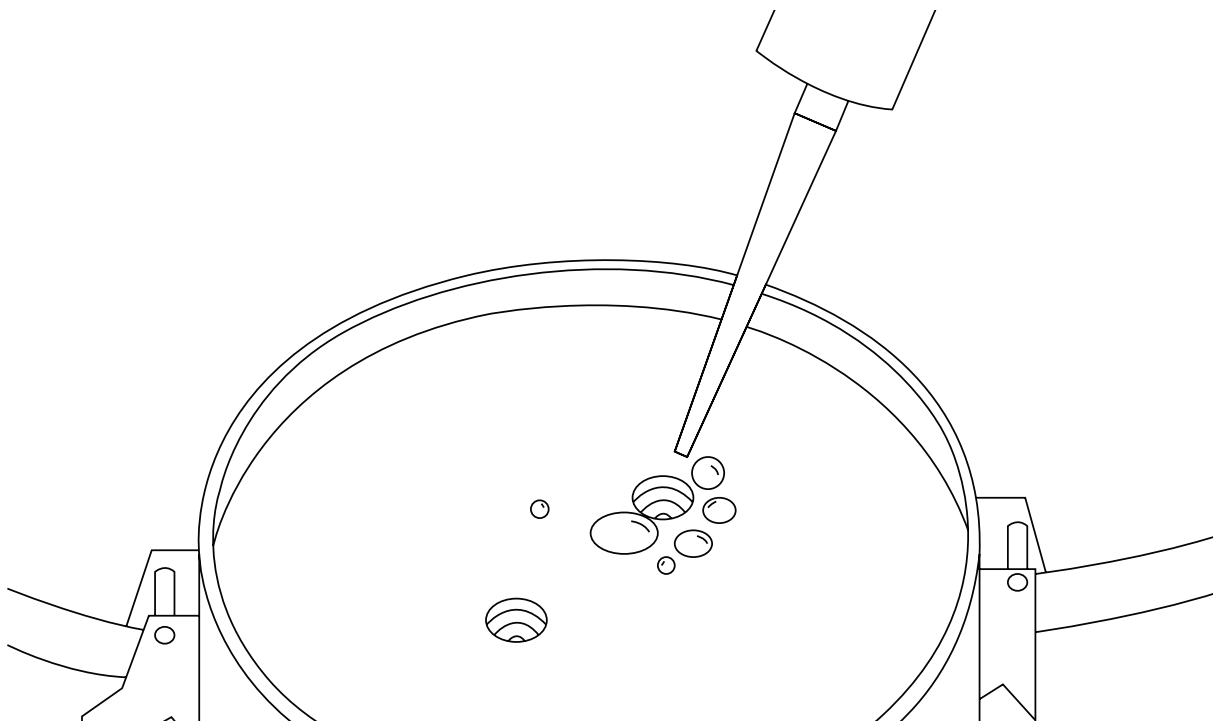


Figure 12 Fill HYPROP holes

⚠ CAUTION

Do not stick the syringe tip into the holes of the sensor unit. You may damage the pressure sensor.

2. Place the refilling adapter on top of the sensor unit and attach it.
3. Use 23 mL of deionized water, free of bubbles or air, to fill the refilling adapter with the droplet syringe (Figure 13).

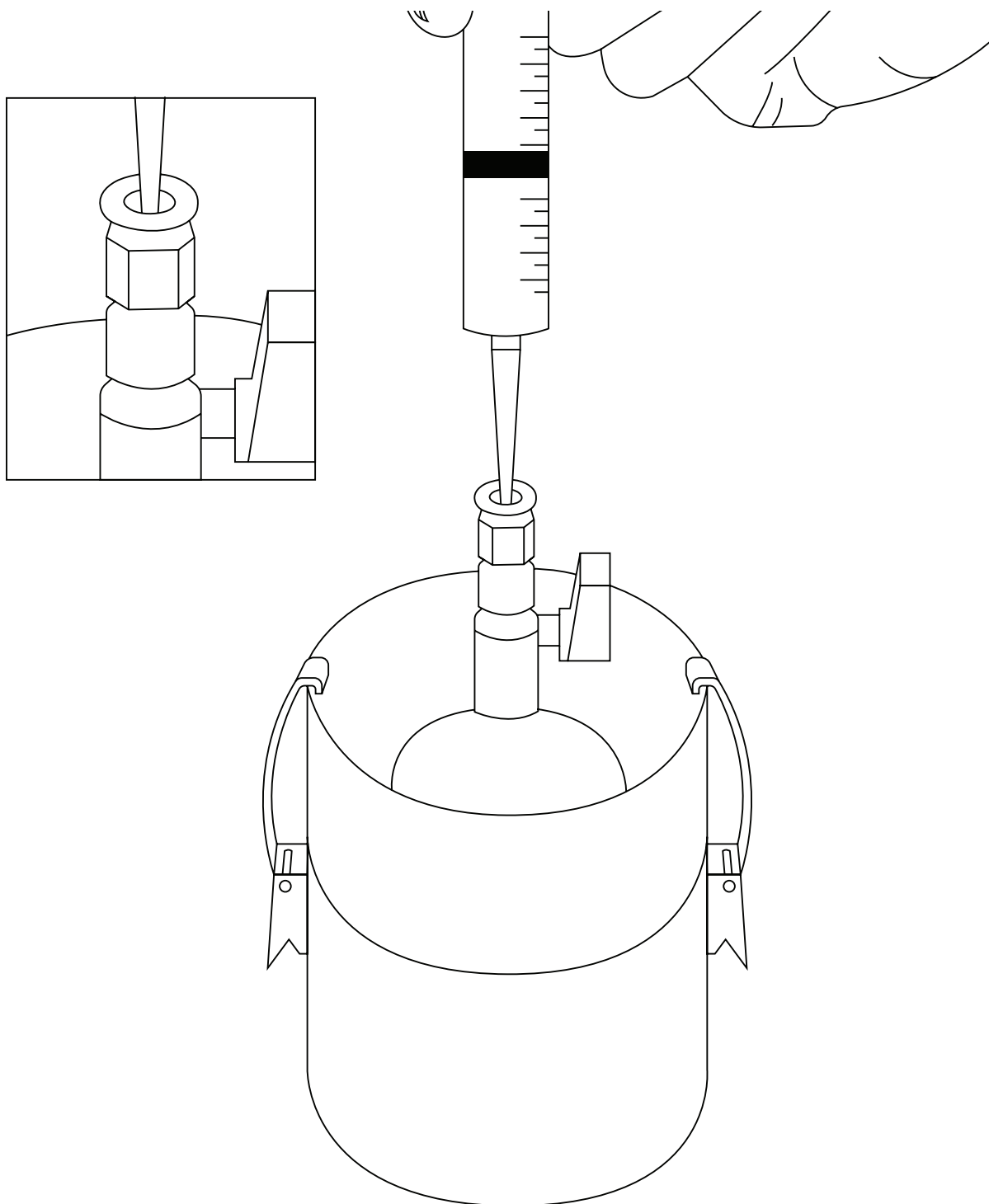


Figure 13 Fill the refilling adapter

4. Fill the vacuum syringe with 15 to 20 ml of deionized water.
5. Degas the water in the syringe as explained in Degassing the Water.
6. Push the tube piece onto the vacuum syringe and push the syringe to fill the tube ([Figure 14](#)).

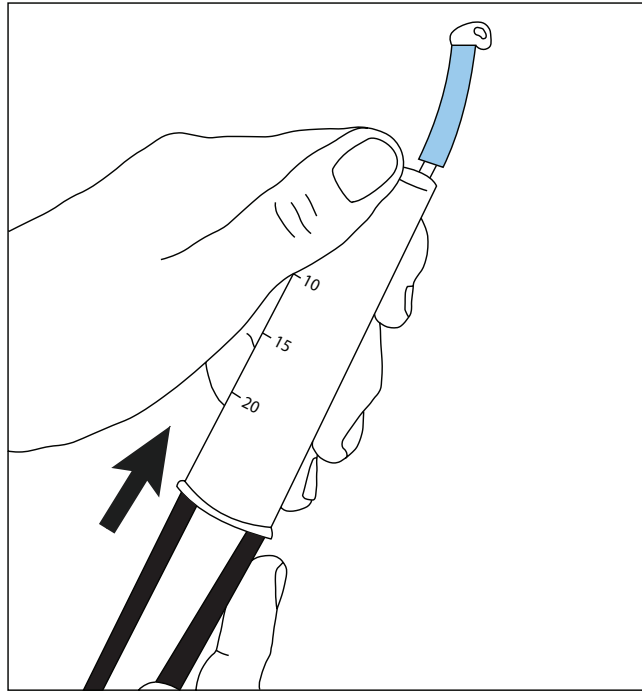


Figure 14 Tube piece on vacuum syringe

7. Connect the tube to the fitting of the refilling attachment.
8. Pull out the plunger of the vacuum syringe until the plunger stoppers snap (Figure 15).
9. The vacuum in the syringe removes the air from the water in the sensor unit and the refilling adapter. Air bubbles will appear if the air-removal process is working.

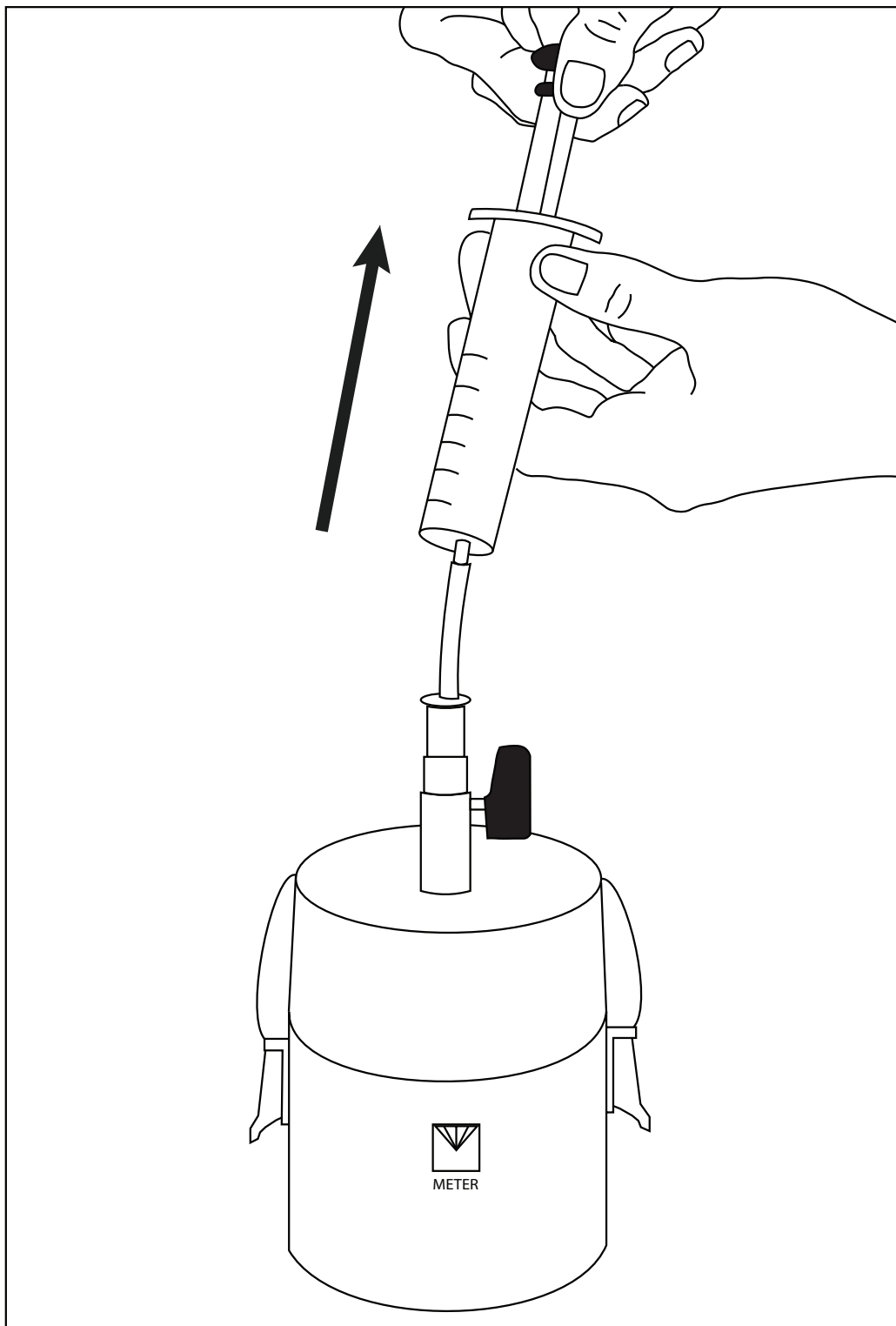


Figure 15 Degas the water in the sensor unit

10. Let the air bubbles rise into the tube by cautiously knocking and shifting the sensor unit (Figure 16).

⚠ CAUTION

Be extremely cautious. Do not let the syringe plunger shoot down because the pressure shock will damage the pressure sensor.

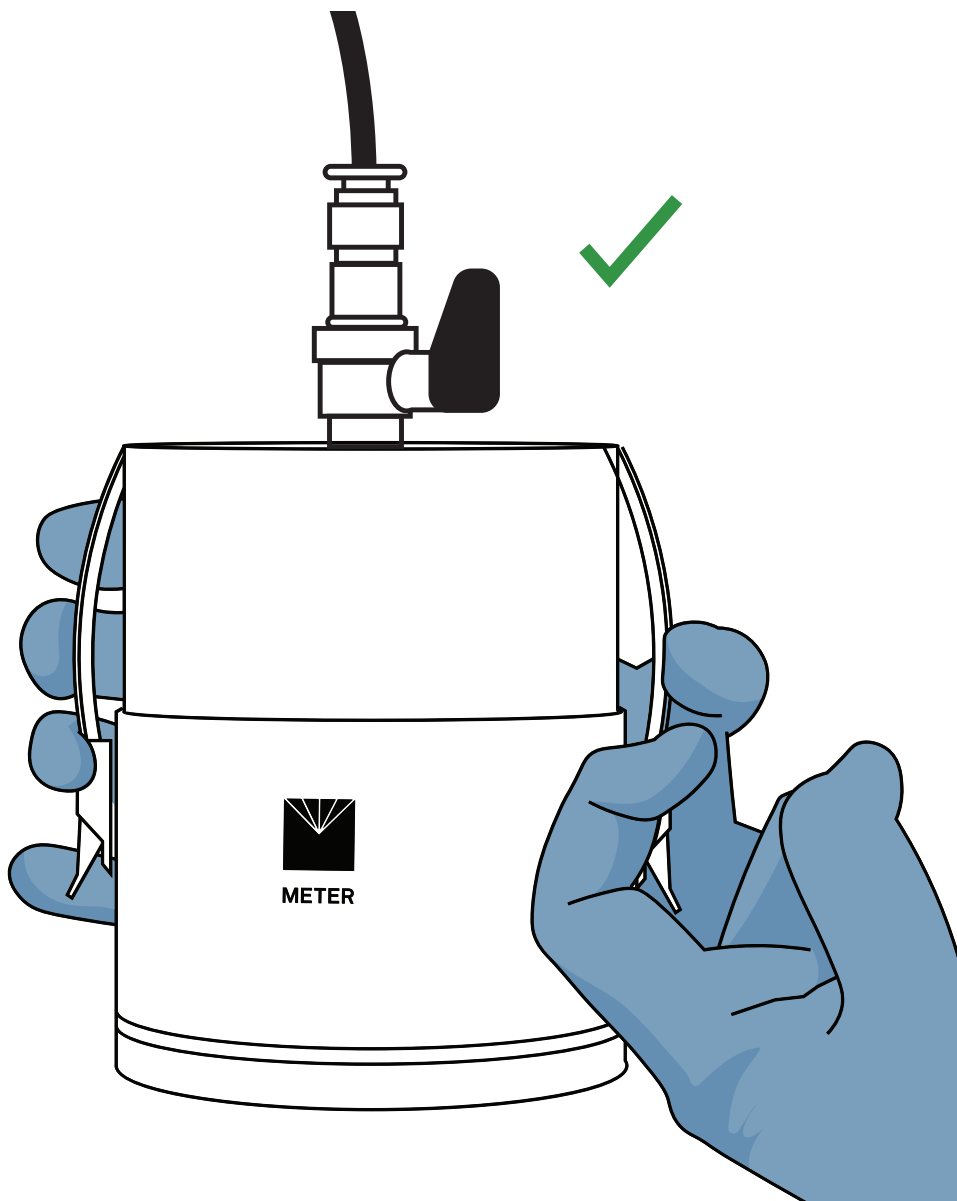


Figure 16 Remove air bubbles

⚠ CAUTION

Never bump the sensor unit on a hard surface. The impact will cause pressure shocks that damage the pressure sensors ([Figure 17](#)).

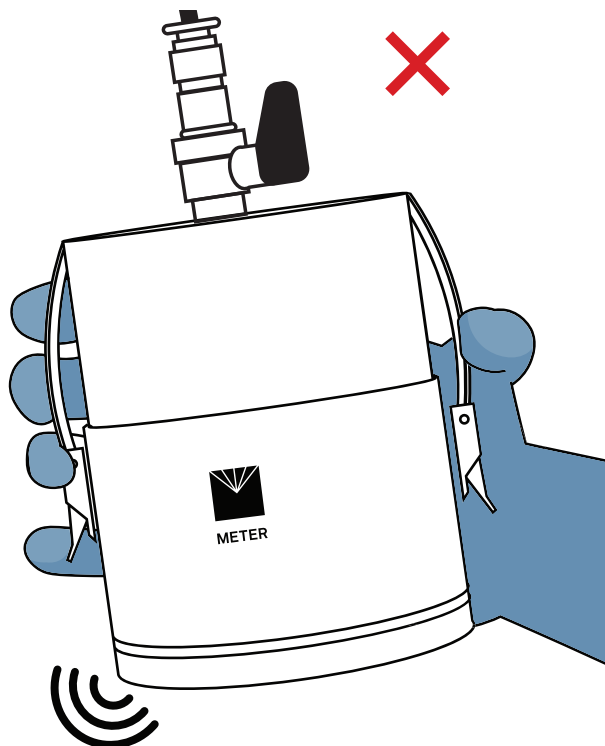


Figure 17 CAUTION: do not bump on hard surface

11. To relieve the pressure, hold the plunger and the syringe.
12. Press in the plunger stoppers and let the plunger slowly move forward (Figure 18).

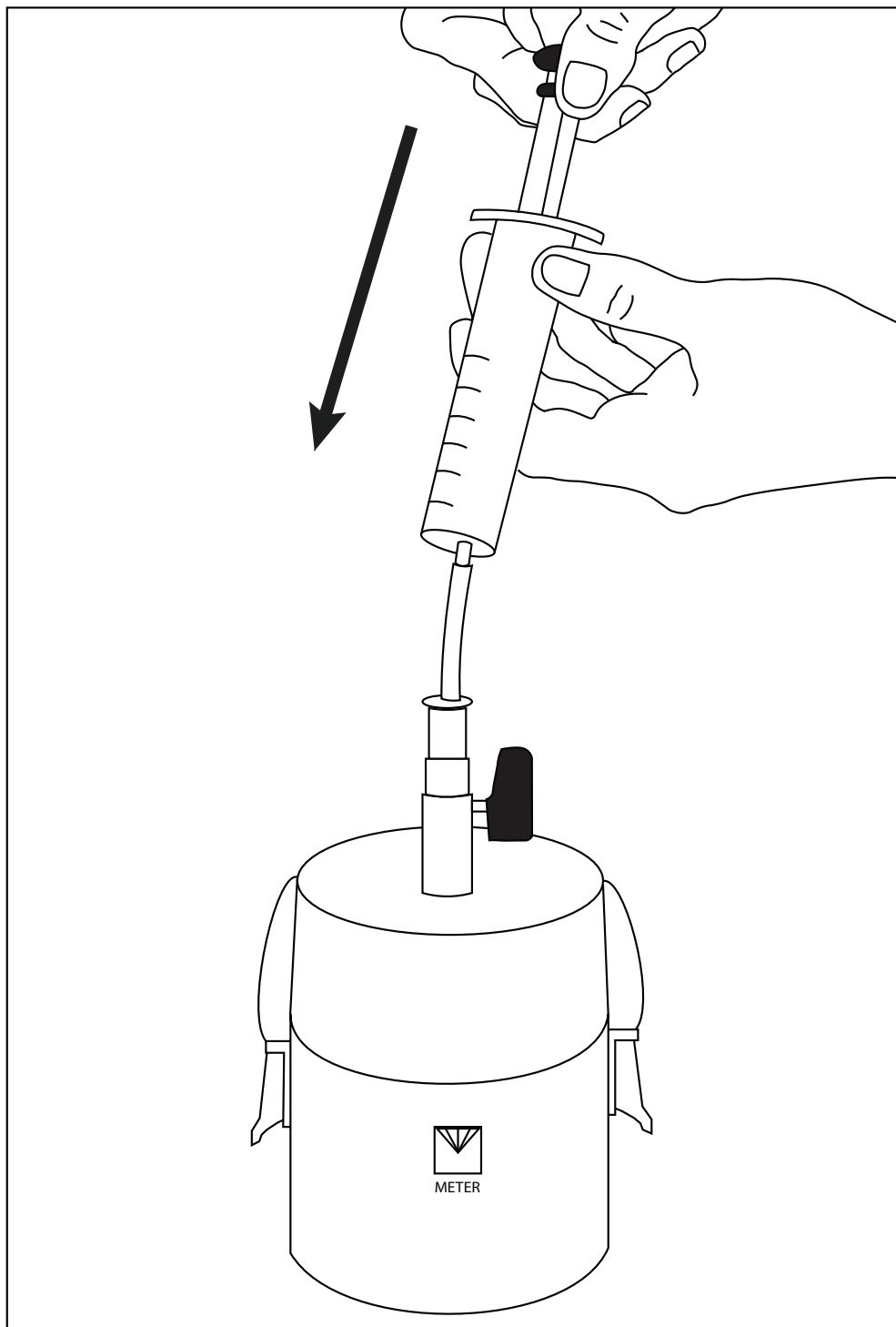


Figure 18 Release the plunger

⚠ CAUTION

Be extremely cautious. Do not let the syringe plunger shoot down because the pressure shock will damage the pressure sensor.

13. Remove the syringe from the tube, turn it upside down, and remove residual air (Figure 19).

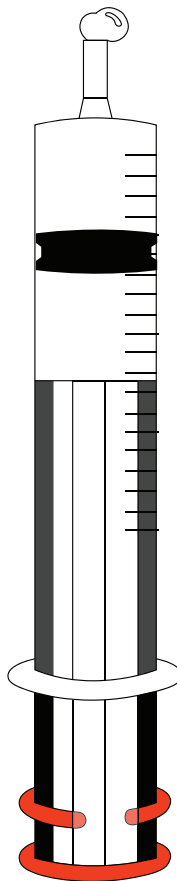


Figure 19 Remove air

14. Repeat steps 7 through 13 until no air bubbles are visible.
The water is now degassed.
15. Connect to a computer and use the LABROS SoilView software to check if the vacuum is being reached (go to meter.ly/hyprop-support to download the LABROS SoilView software and user manual).
The pressure shown on the screen of the Refilling Wizard in LABROS SoilView Software must reach a vacuum value equal to the atmospheric air pressure minus 20 hPa (2 kPa).
If this value can be reached, the sensor unit is ready for measurement after about 3 h.
If the vacuum value does not reach a pressure equal to the atmospheric air pressure minus 20 hPa (2 kPa), the reasons might be:
- A dead volume in the syringe
 - Air in the tube
 - A leakage in the system (e.g., between the sensor unit and the refilling adapter)
- After the problem is fixed, the system must be degassed again.

For additional questions or support, contact [Customer Support](#).

CUSTOMER SUPPORT

NORTH AMERICA

Customer service representatives are available for questions, problems, or feedback Monday through Friday, 7 am–5 pm Pacific time.

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If contacting METER by email, please include the following information:

| | |
|---------|----------------------------|
| Name | Email address |
| Address | Instrument serial number |
| Phone | Description of the problem |

NOTE: For products purchased through a distributor, please contact the distributor directly for assistance.