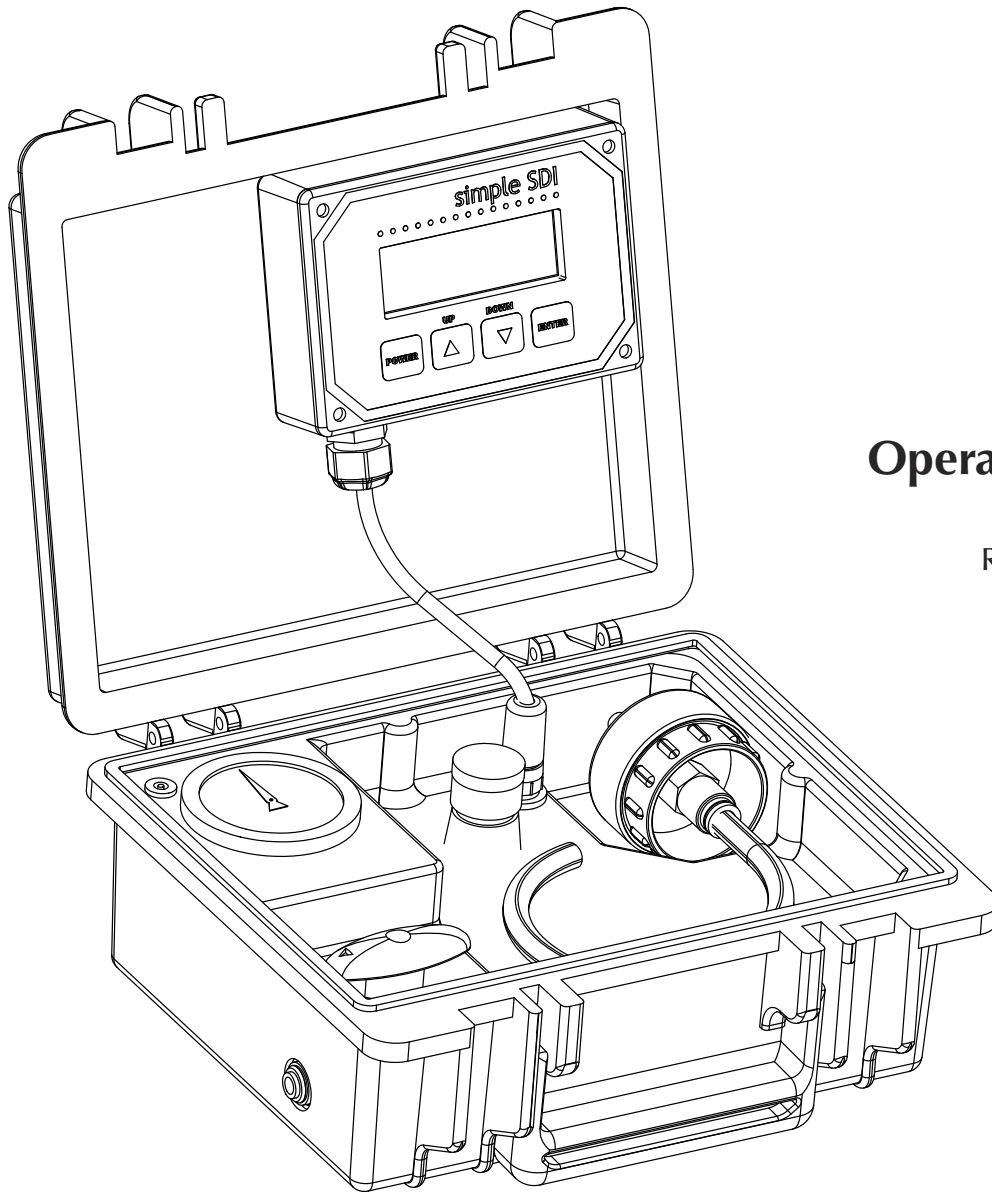


simple SDI:auto



Operators Manual

Revised June, 2005

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Introduction

Thank you for purchasing **simple SDI**. We hope you'll find **simple SDI** to be an indispensable tool.

We designed **simple SDI** with feedback from experts familiar with other automated SDI measurement systems as well as those who'd performed more manual tests than they care to remember. We incorporated as many of their suggestions as we could. For example:

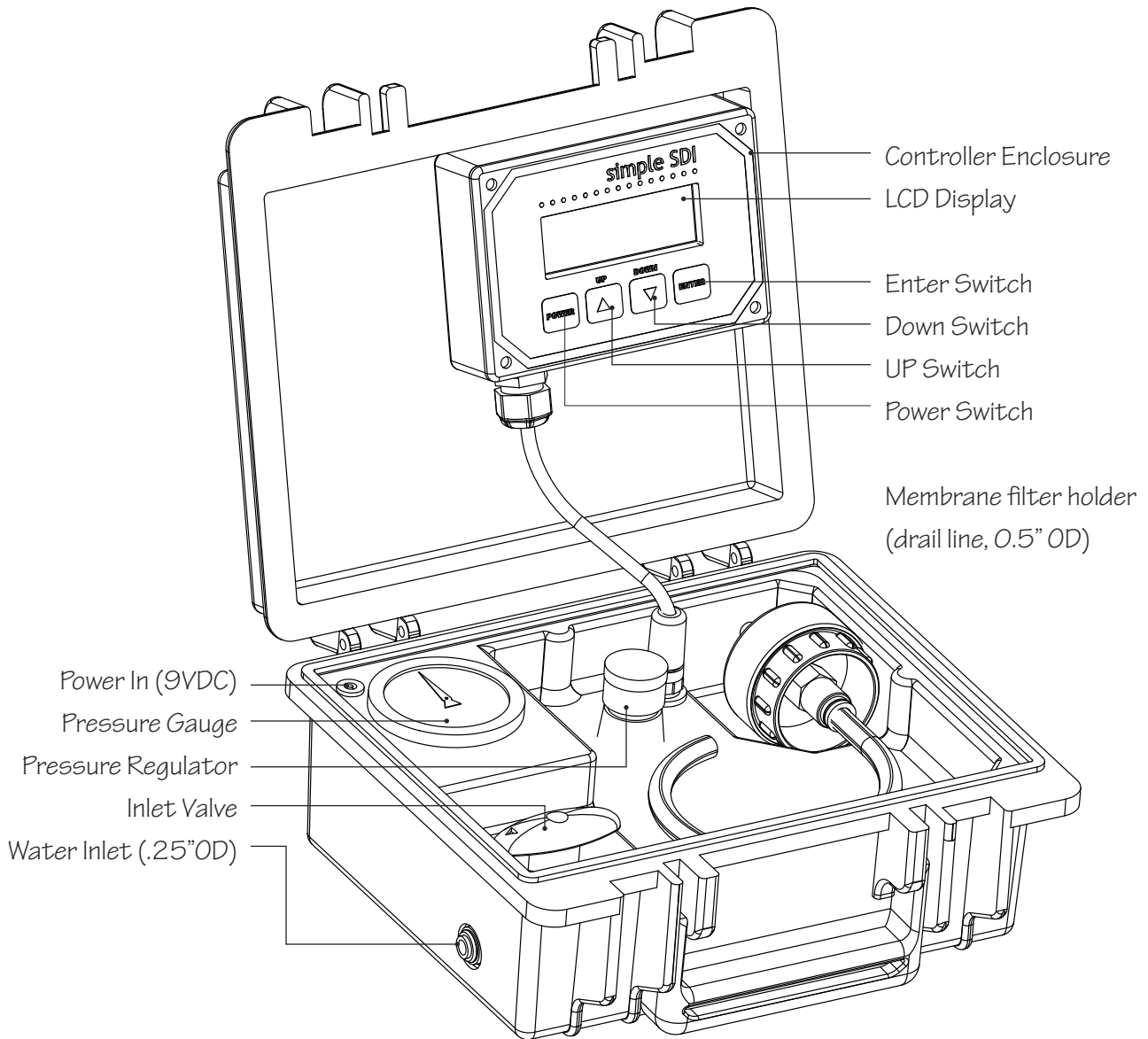
- **simple SDI** is battery powered for true portability.
- **simple SDI** uses standard .45 micron, 47 mm membranes, no encapsulated or proprietary size single-source membranes.
- **simple SDI** operates on as little as 35 psi feed water pressure. Testing is now possible on many water supplies that previously required a booster pump.
- **simple SDI** is housed in a rugged crush-proof case. No flimsy tissue-thin plastic here.

As good as **simple SDI** is, there's always room for improvement. If you have an experience, idea or input either positive or negative we'd love to hear from you.

Again, thanks for your purchase. Welcome to the community of **simple SDI** users.

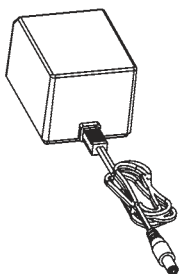
simple SDI:auto

Getting to know simple SDI: Overview

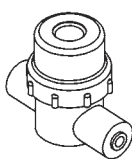


Included with simple SDI:auto

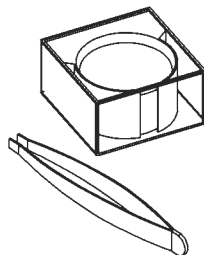
Power Supply-
Battery Charger



Prefilter
(50 micron)

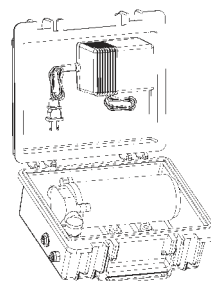


Membrane Filters
(100) & Tweezers

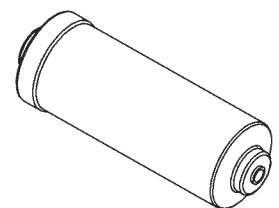


Optional Components

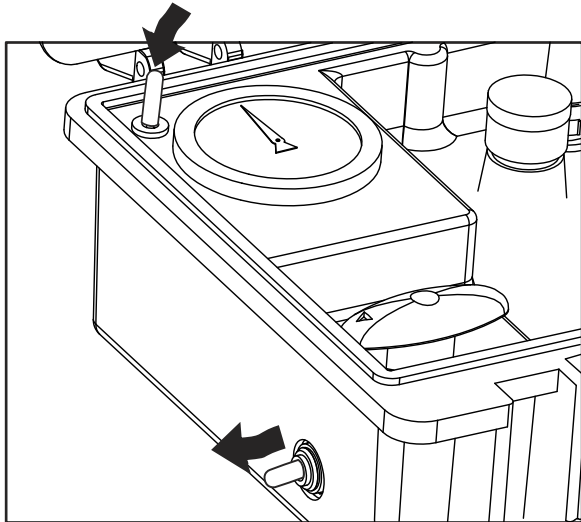
Booster Pump System



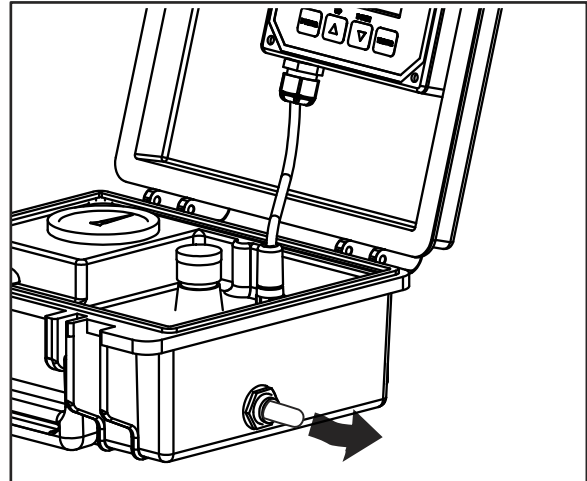
Prefilter
(5 micron)



Setting up simple SDI: Getting Started



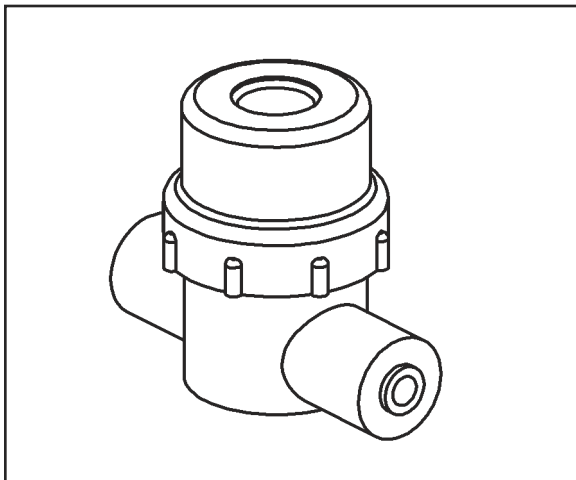
Remove the vinyl plug from the water Inlet fitting and place it in the Power In jack.



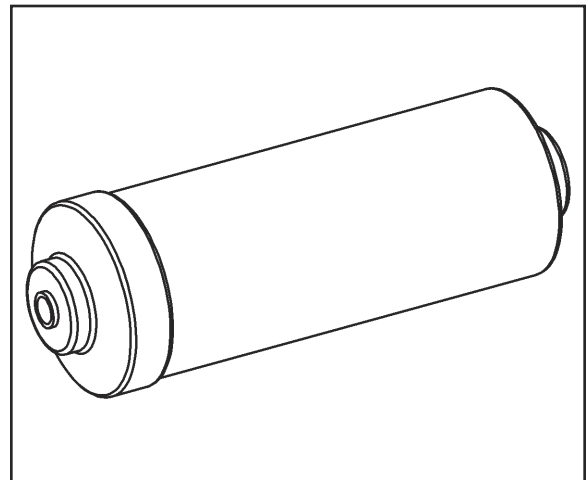
Remove the vinyl cap from the outlet fitting on the right side of the meter.

- • • • Note: Replace the vinyl caps after testing to protect the internal components from foreign particles and to retain the collets on the fittings.

Setting up simple SDI:auto Prefilter Selection



The minimum prefiltration requirement is the 50 micron prefilter. This filter should be used on every test. The filter is too large to effect the SDI results but small enough to protect the internal components of simple SDI from damage.



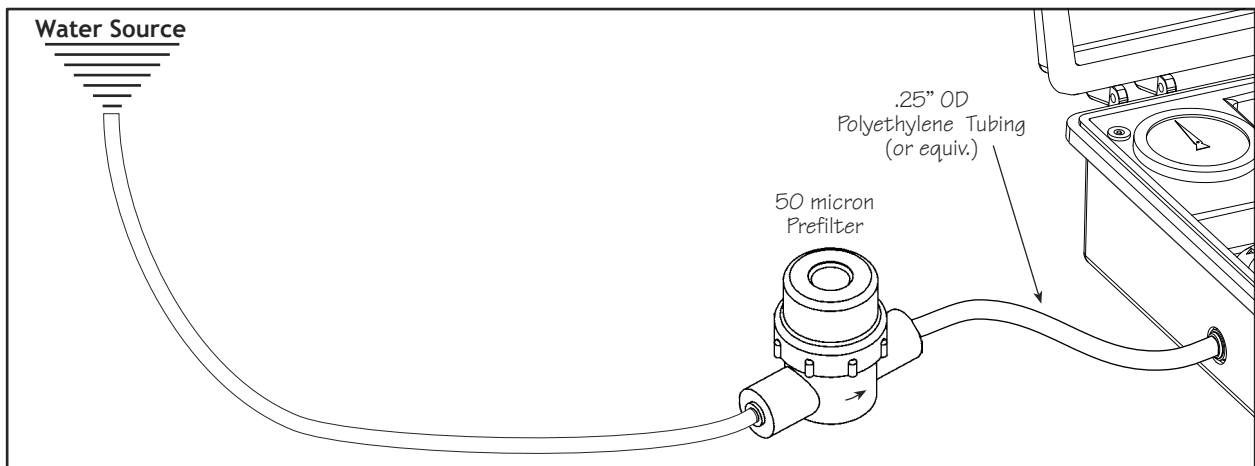
For many water supplies, the optional 5 micron prefilter is also required. Use the 5 micron filter on unfiltered water supplies or on water supplies where the SDI results are high (e.g. SDI15 greater than 5) or whenever you receive an "OVER-RANGE" error message indicating that the plugging factor is 90% or greater.

Setting up simple SDI: Prefilter installation and Supply Water Connection

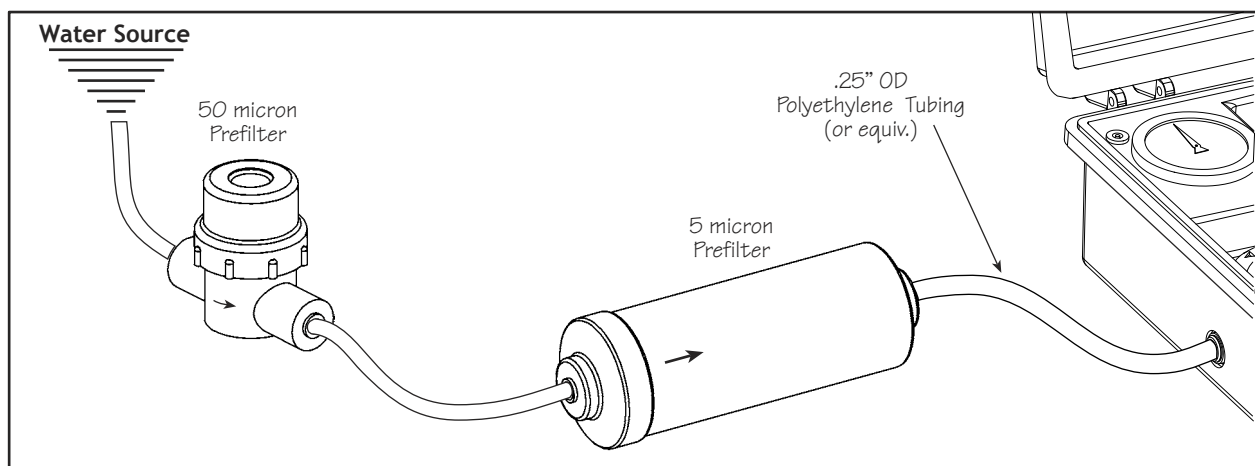
The illustrations below show how to connect the prefilters. Please note the direction of the flow arrows on the filters and connect them in the proper orientation. Use the blue 1/4" OD Polyethylene tubing supplied. There are two short pieces for interconnecting the filters and connecting to simple SDI. There's one long piece for connecting to the water supply.

- • • • Note: These instructions assume familiarity with the Quick-Connect type fittings that we use. If you haven't used these fittings before, please see the appendix for a tutorial on how to use them.

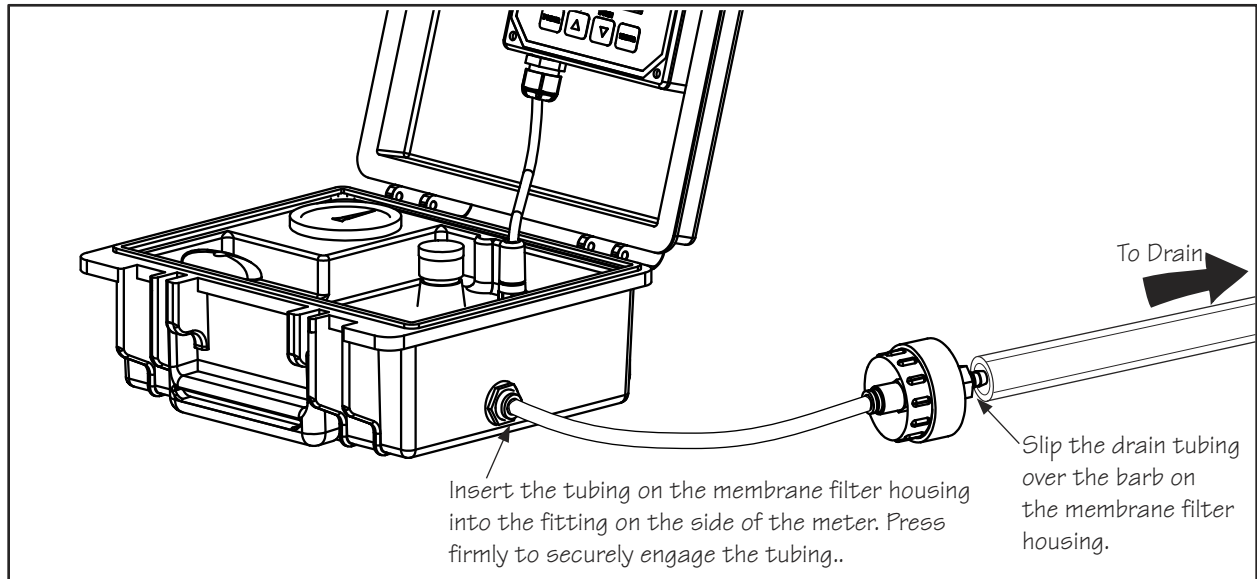
Feed water connection for prefiltered water supplies.



Feed water connection for all other water supplies.

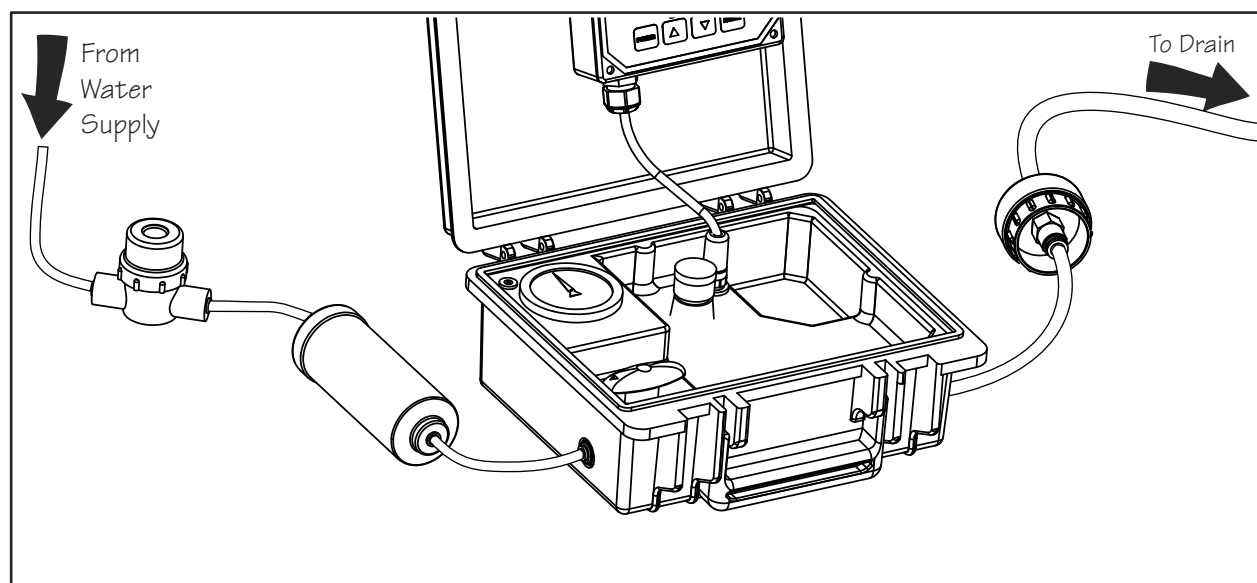


Setting up simple SDI: Filter Holder and Drain Line Connection



- • • • The drain should be able to handle 2 liters/minute for a short duration during flushing and 1 liter/minute or less for the duration of the test. If a bucket is used it should have about 5 gallons capacity.

Connections Complete



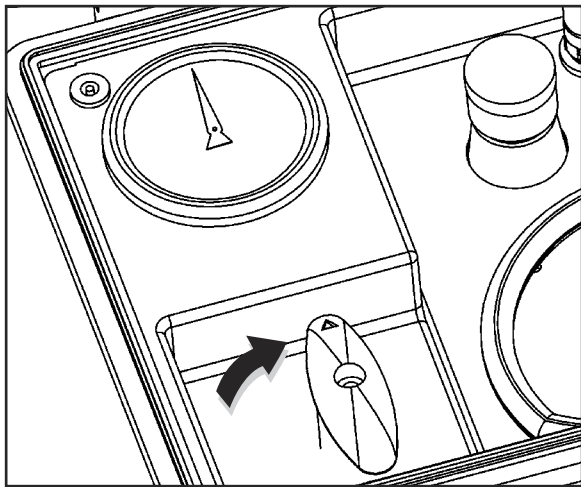
simple SDI is now connected and ready for start-up.

Setting up simple SDI: Start-up & Test Procedure

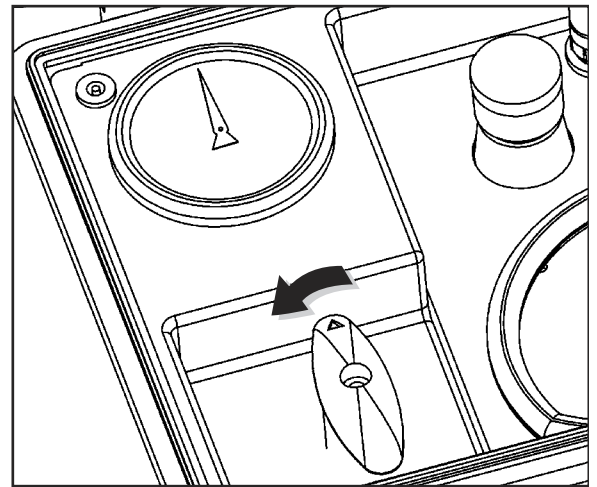
The Start-Up and Test procedure is really 4 simple steps.

1. Flush the air out.
2. Install the membrane filter.
3. Adjust the pressure.
4. Start the test.

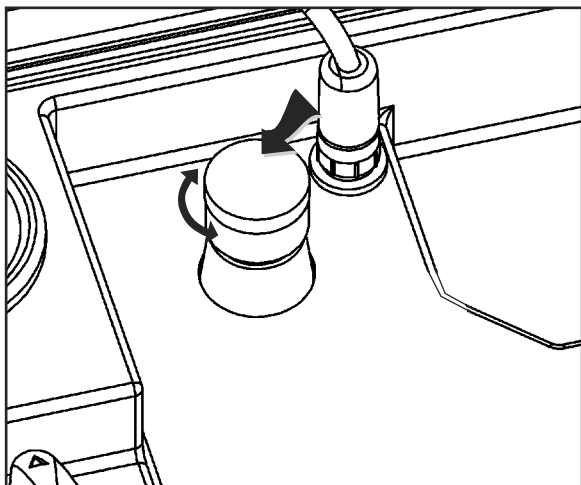
However, simple things are often harder to explain than they are to do. Bear with us. We'll have you up and running in no time.



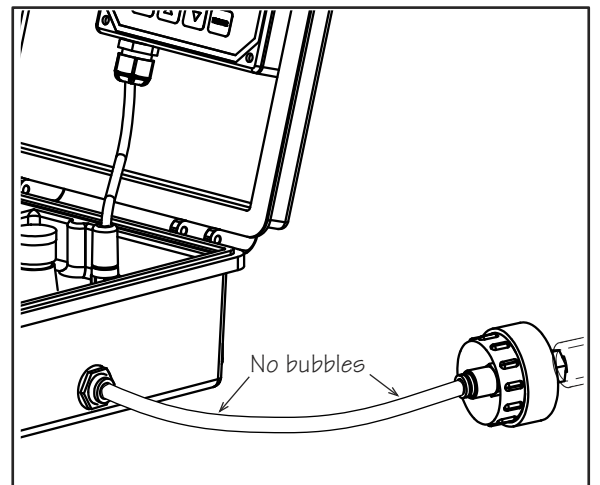
Close the Inlet Valve on simple SDI.
Open the valve at the water source.



Slowly open the Inlet Valve on simple SDI by turning the handle counterclockwise. Water will flow through simple SDI.



Tapping on the pressure regulator and/or turning the knob helps to dislodge air bubbles.

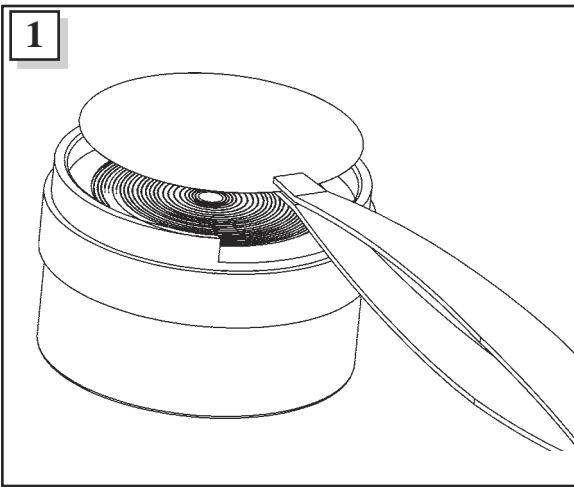


Allow the water to run for 15 seconds or so or until you see a clear bubble-free stream of water flowing through the clear blue tubing. Close the Inlet Valve.

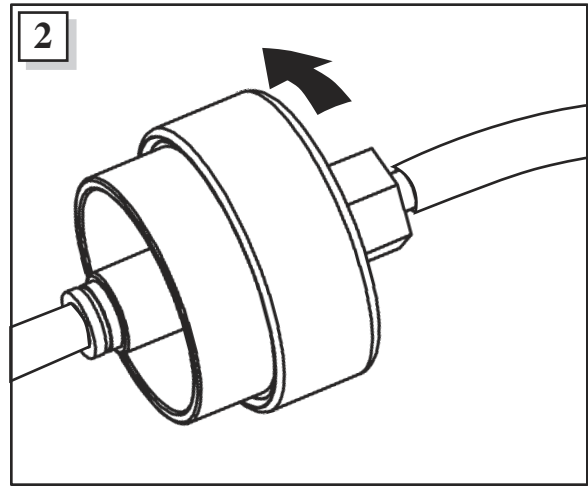
Setting up simple SDI: Test Procedure

- The next step is to install the membrane filter. As simple as this sounds there are at least two distinct ways and perhaps a number of hybrid methods for doing this. We're going to explain two methods. You chose the method that works best for you.

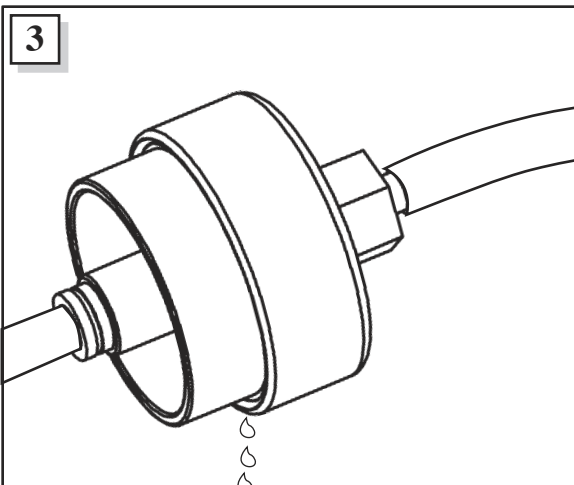
Filter installation:Technique #1



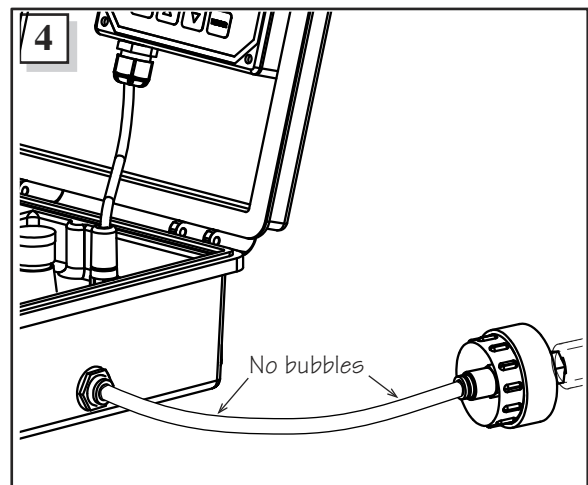
Open the membrane filter housing. Using the tweezers provided, place a membrane on the face of the filter housing. (Note that the membranes are white and are separated by light blue pieces of paper. Make sure that you have a membrane and only a membrane.)



Put the top back on the membrane filter housing but do not fully tighten it. Leave it loose enough so that water can freely escape, about 1/2 turn less than fully tight.



Open the inlet valve-just enough for water to flow. Allow water to dribble out of the housing.

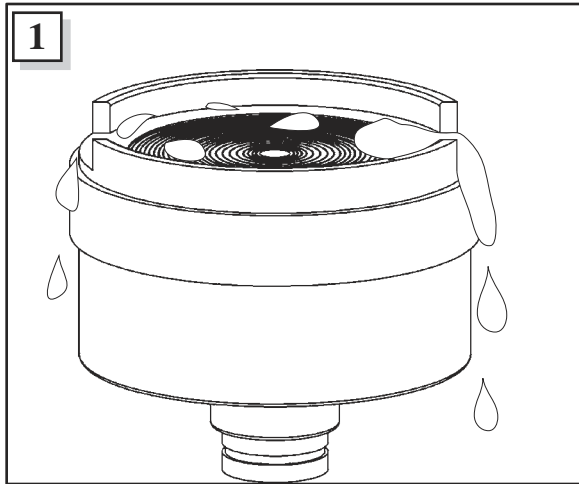


When you see clear bubble-free water in the clear blue tubing, tighten the housing and close the Inlet Valve. With the inlet valve closed, tighten the housing further if necessary. (Go to Page 10.)

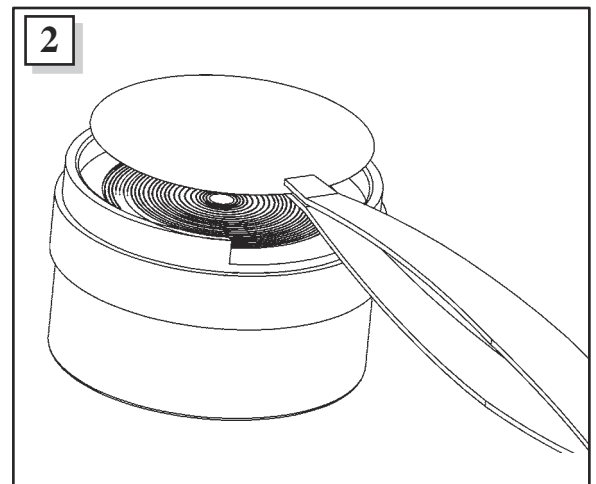
simple SDI:auto

Setting up simple SDI: Test Procedure

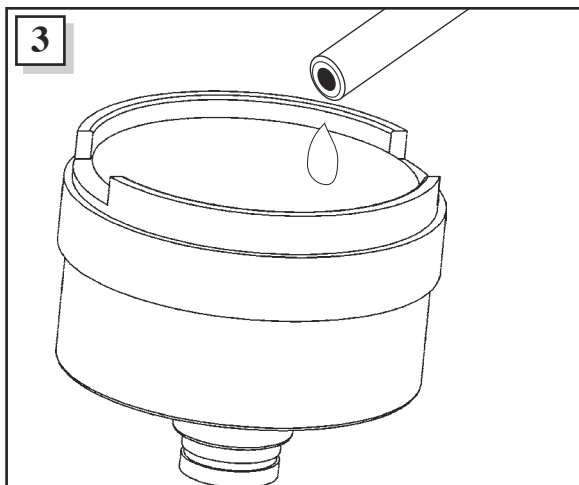
Filter installation:Technique #2



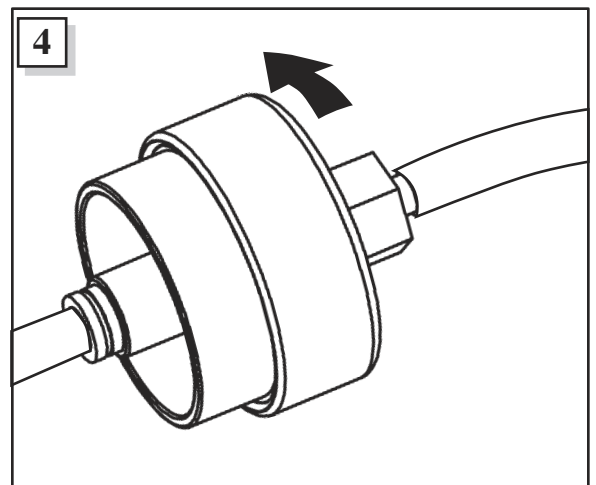
Open the membrane filter housing. Hold the inlet half of the filter housing in one hand. Tilt the filter housing UP so that the face of the housing is up and parallel to the ground. Open the inlet valve very slightly so that water spills out of the housing. Close the valve while keeping the filter housing face up and parallel to the ground.



Using the tweezers provided, place a membrane on the face of the filter housing. *(Note that the membranes are white and are separated by light blue pieces of paper. Make sure that you have a membrane and only a membrane.)*



Next, wet the membrane thoroughly. An eye-dropper or small bottle with a spout are helpful in doing this.

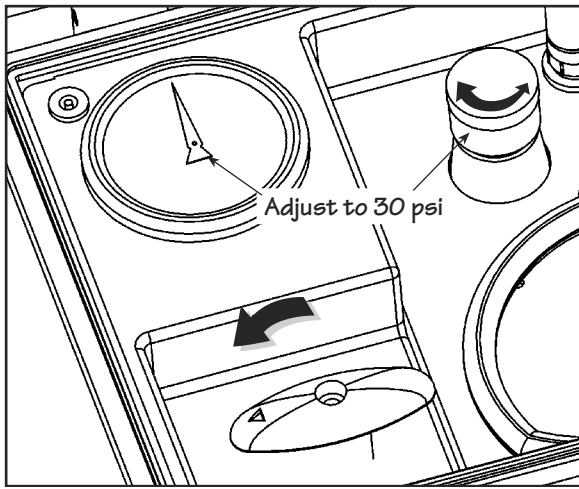


Once the membrane has been wetted thoroughly, put the top back on the membrane filter housing and tighten fully. *(Go to Page 10.)*

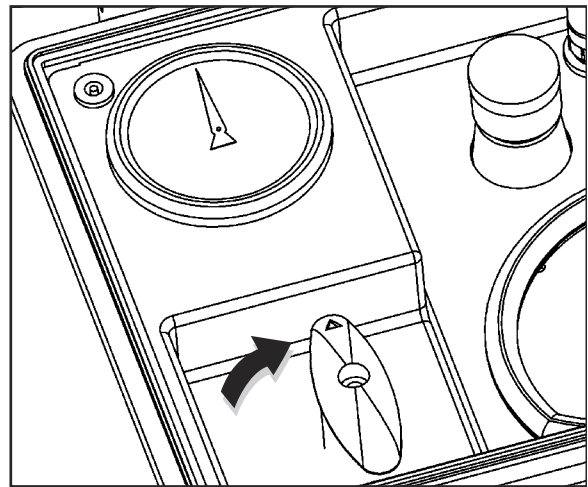
Setting up simple SDI: Test Procedure

- With the system purged of air bubbles and the membrane filter installed, the only things left are to adjust the pressure and start the test.

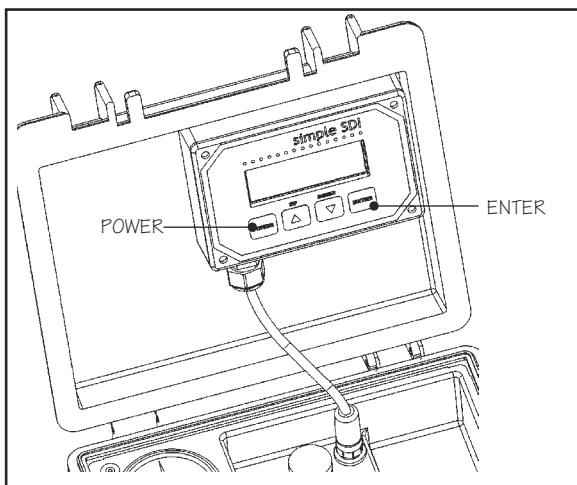
Adjusting the test pressure.



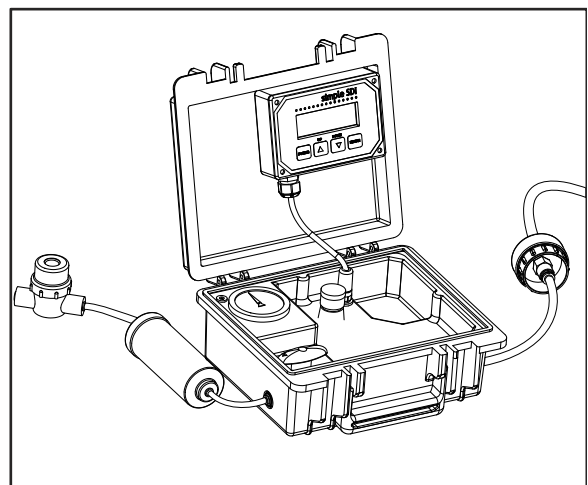
Open the Inlet Valve and as quickly as possible adjust the pressure to 30 psi. (Turning the knob on the pressure regulator clockwise increases the pressure, turning it counter-clockwise reduces the pressure.)



As soon as you reach 30 psi, close the inlet valve. This procedure is only necessary on the first test on a given water supply. On subsequent tests the pressure can be adjusted, if necessary, during the first few seconds of the test.



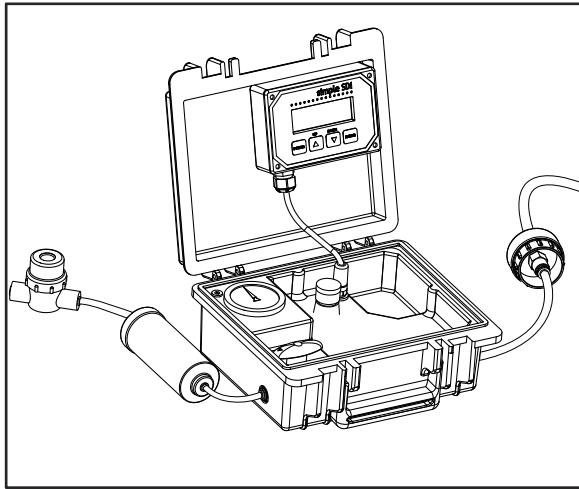
Turn the Power ON. After the Welcome screen comes up, Press ENTER to begin the test. OPEN the inlet valve. As soon as the water starts flowing, the test will begin automatically.



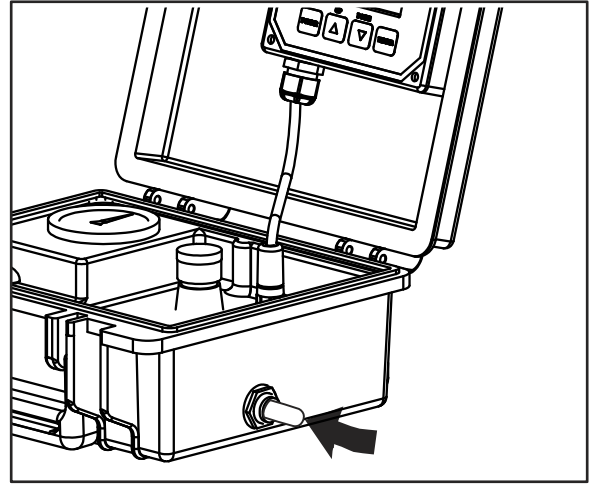
Monitor the meter as the test begins. As the membrane fouls, the pressure will increase. For optimum accuracy re-adjust the pressure to 30 psi. After the first 4 to 5 minutes the pressure will stabilize. The test will take approximately 20 minutes to complete.

simple SDI:auto

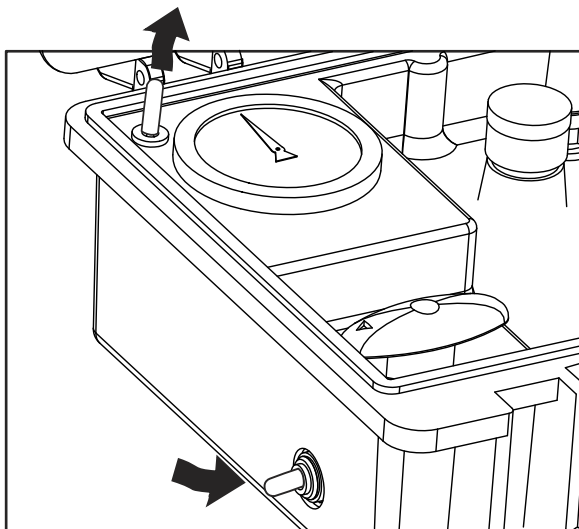
Operating simple SDI: End of test clean-up and routine maintenance



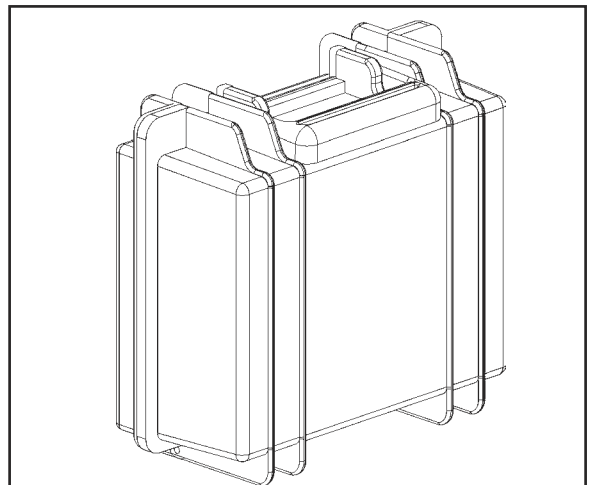
When you are finished testing, close the valve at the supply source. Disconnect simple SDI from the source. Disconnect the prefilters and drain line. Drain as much of the water from the tubing and filters as possible.



Place the vinyl cap into the outlet fitting on the right side of the meter.



Remove the plug from the Power Inlet fitting and put it into the inlet fitting.



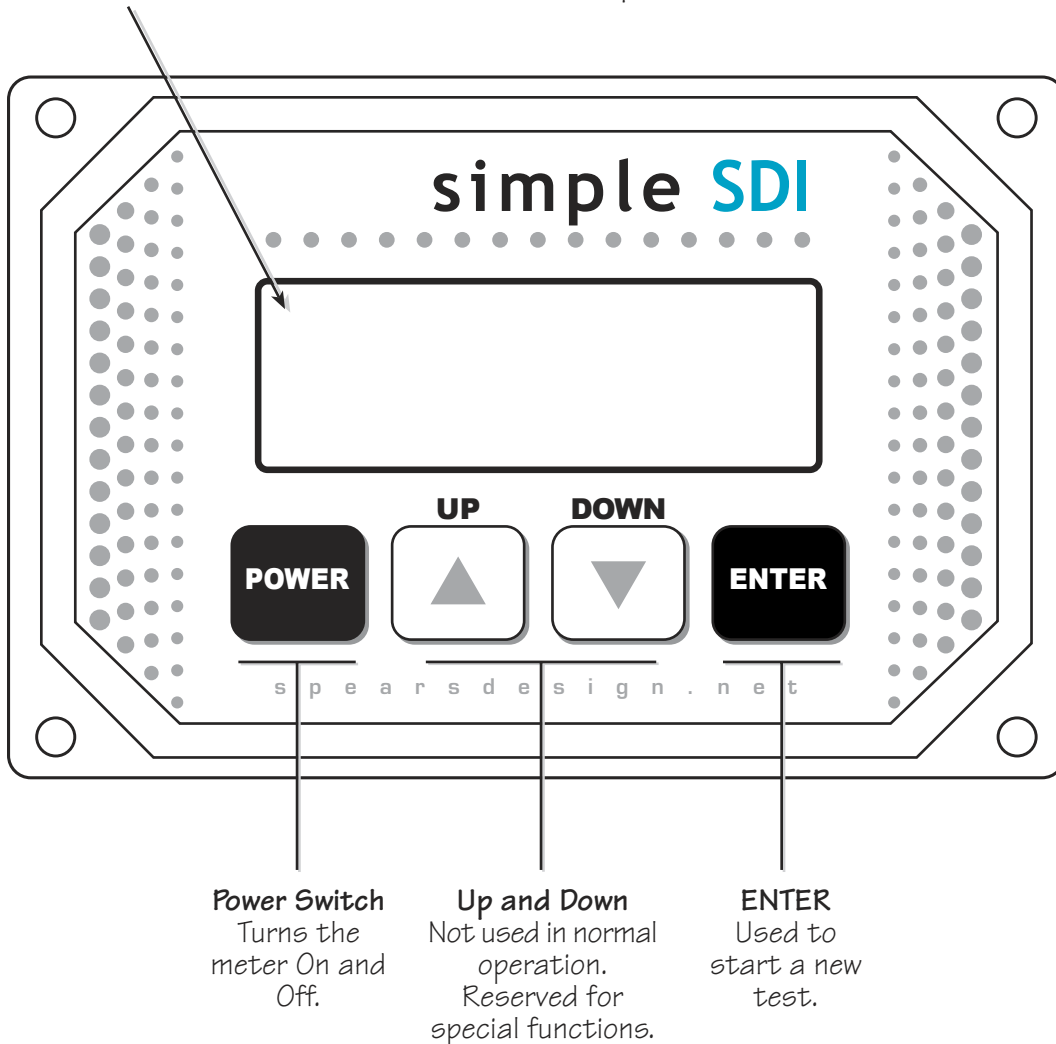
Close the case and stand the meter vertically so that the handle is up. This will allow any water inside the bottom part of the meter to drain out.

Operating simple SDI: Controller Operation

- The controller is the heart of simple SDI. It performs all of the control, measurement and calculation functions necessary to conduct a SDI test. Below is a close-up view of the controller with call-outs explaining the primary control elements.

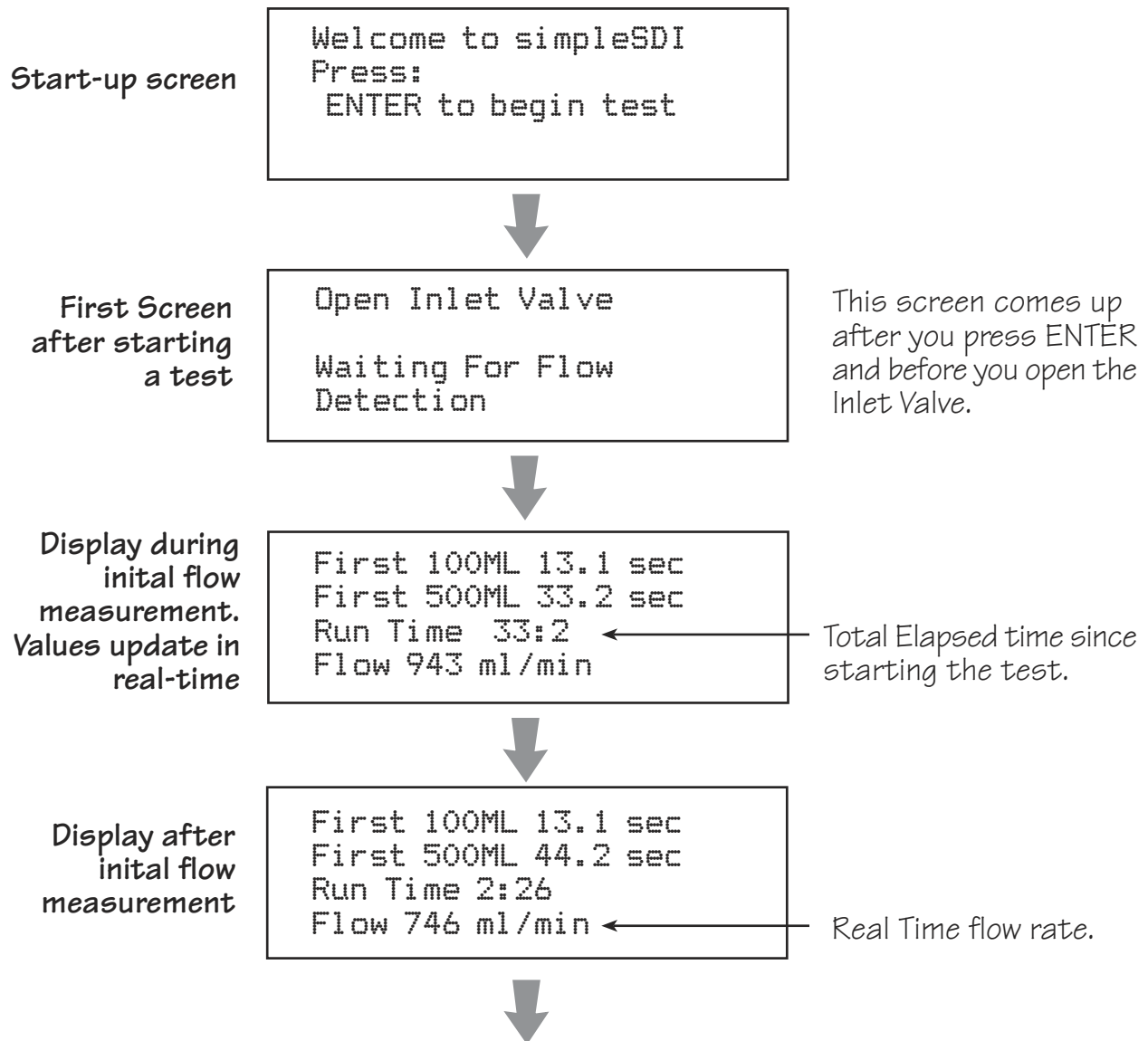
Display

Shows current information relative to the status of the meter. Shows status of tests in process and the final results of tests when they're completed.

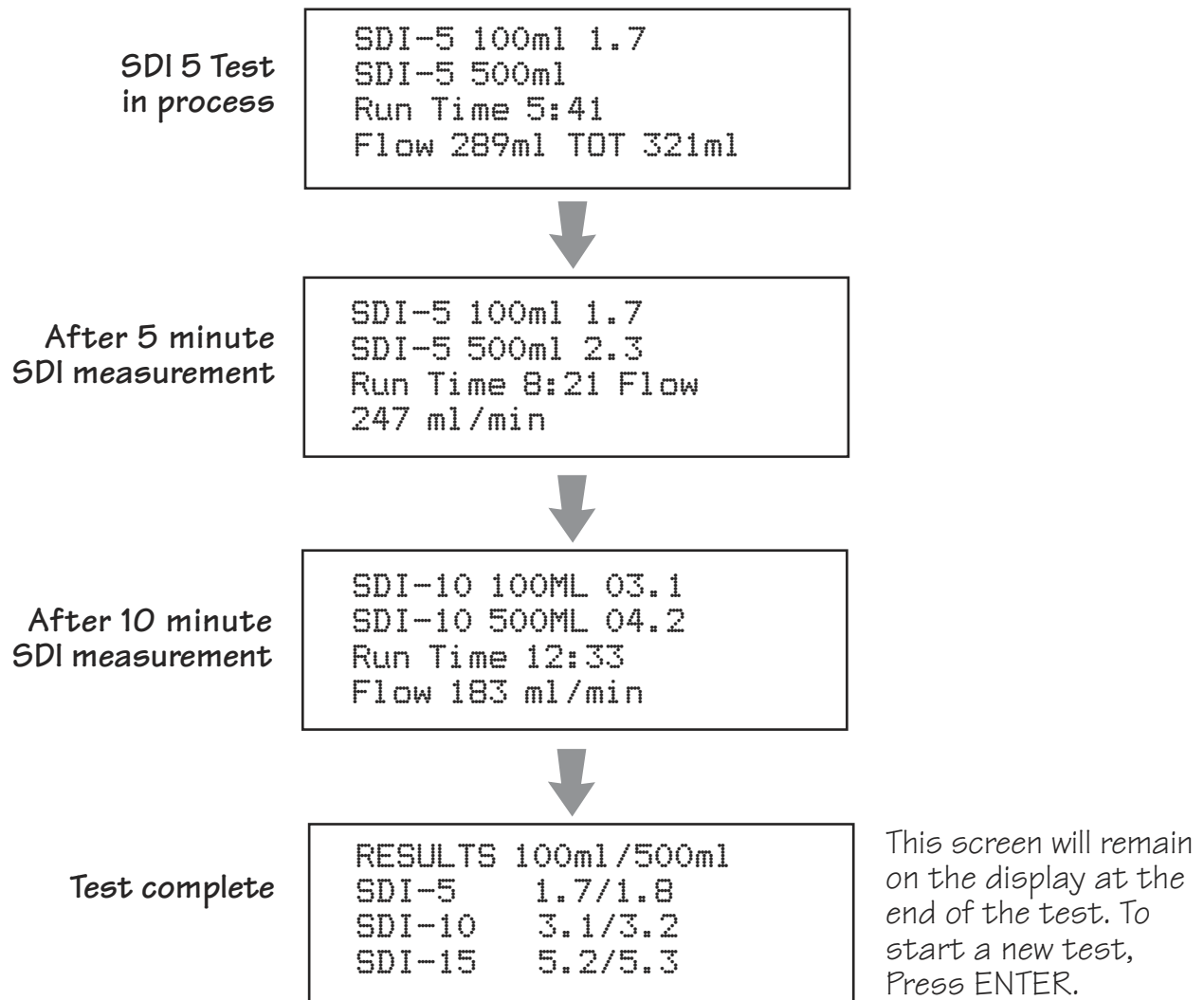


Operating simple SDI: Controller Operation

- Shown below and on the next page are representative displays from different points during the course of an SDI 15 test.



Operating simple SDI: Controller Operation



Operating simple SDI: Troubleshooting

There are two basic error conditions that the controller reports. One condition is related to low flow, the other to an increase in flow.

Low flow error/OVERRANGE

```
RESULTS 100/500
SDI-5 OVERRANGE
SDI-10
SDI-15
```

- To clear the error condition press ENTER on the controller.

Cause

When the results screen appears with a value or OVERRANGE for the 5, 10 or 15 minute SDI a low-flow condition is indicated. This message is displayed whenever the time to conduct the 5 or 10 minute SDI test exceeds 5 minutes or when the SDI15 result would be 6.0 or greater.

Correction

If you receive this error, the water you are testing is so high in the constituents of SDI that a meaningful test is not possible. Check the filtration that's in place before the meter. If the 5 micron prefilter was not used during the test, adding it may allow a meaningful reading. If the 5 micron filter was used, the water is high in sub-5 micron constituents. Installing an absolute rated 5 micron filter or a 1 or 2 micron filter may be necessary to obtain meaningful results. If you're evaluating an existing filtration system, corrective measures are indicated.

High Flow Error

```
FLOW RATE GREATER
THAN INITIAL FLOW.
CHECK FOR TORN
MEMBRANE OR LEAK.
```

- To clear the error condition press ENTER on the controller.

Cause

This message is displayed whenever the flow rate increases relative to the initial flow rate. An increase in flow usually indicates an air-bubble on the surface of the membrane at the beginning of the test that subsequently cleared and allowed an increase in membrane surface area with a corresponding increase in flow. It can also indicate a torn membrane or an error in setting the initial pressure. (e.g. test was started at less than 30 psi and then manually adjusted up to 30 psi after the test had begun.

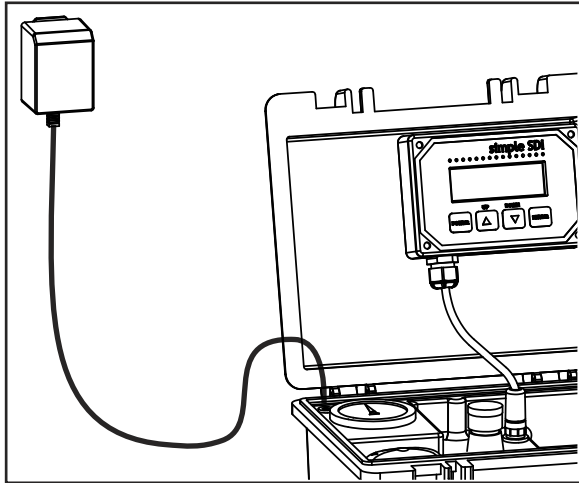
Correction

Purge the air from the system and begin a new test.

Replace the torn membrane and begin a new test.

Carefully adjust the pressure when starting a new test.

Operating simple SDI: Battery charging and care.



NOTE:
Charge the battery at the end of each day's use. Failure to keep a charge on the battery or allowing the battery to fully discharge will shorten the battery life.

To charge the battery simply plug the supplied charger /power adapter into the appropriate electrical supply (110 VAC or 220 VAC). Plug the other end of the supplied charger into the Power In plug on simple SDI.

Battery Info

Battery Type: 6 Volt, 1.3 AH Sealed Lead Acid (SLA)

Battery Life: At least 5 years of typical usage.

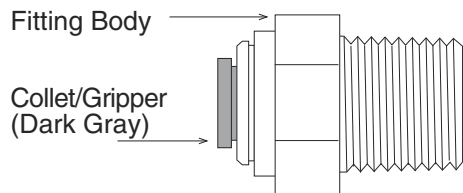
Battery Capacity: Approximately 13 hours of testing. Power consumption is highest during active testing. To conserve the battery, simpleSDI shifts into a "sleep" mode when testing is complete.

Charge Rate:

Charge Frequency: *Charging at the end of each day's use is recommended.* This practice will ensure that you always have a fully charge battery when you need it. Unlike NiCad batteries, the SLA battery used in simple SDI can be charged after every use without diminishing the batteries capacity or useful life. *Failure to keep a charge on the battery or allowing the battery to fully discharge will shorten battery life.*

Operating simple SDI: How to use our quick-connect fittings

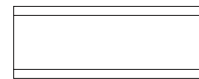
Fitting Overview



Tubing Preparation

The outside of the tubing must be free of nicks and gouges.

Cut tubing with a plastic tubing cutter or a razor knife. Make a clean, square cut.



After cutting, make sure the end of the tube is round. Correct any out-of-roundness that may have occurred in cutting the tubing.

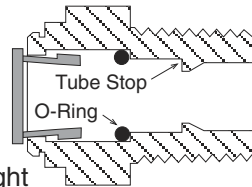
To Attach Tubing:

Cutaway view of fitting and tubing

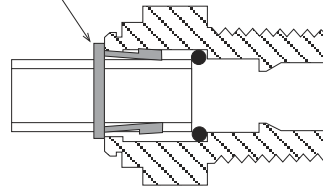
To ease insertion, moisten end of tubing with fresh water or 3% hydrogen peroxide solution.



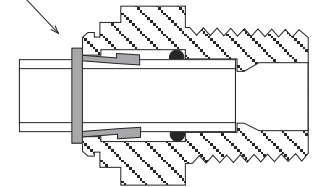
Push tubing straight in as far as it will go.



Note: Resistance will be felt when the tubing meets the O ring.



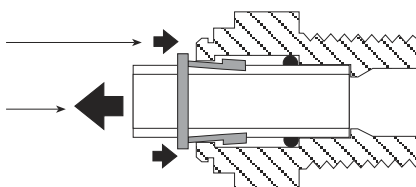
Keep pushing until the resistance is overcome and the tubing rests against the stop.



To Remove Tubing:

Press collet in to release grippers.

While holding the collet in, pull out on the tubing.



It may be necessary to use a partially open crescent wrench or similar device to hold both sides of the collet in while pulling the tubing out.

simple SDI: Specifications

Dimensions	Inch (mm)		
	Wide	Deep	High
	10.75 (273)	9.75 (248)	5 (127)

Weight 5 pounds, (2.3kg)

Electrical

Battery Type:	6 Volt, 1.3 AH Sealed Lead Acid (SLA)
Battery Life:	At least 5 years of typical usage.
Battery Capacity:	Approximately 13 hours of testing.
Power Supply:	110VAC-9VDC 500 ma (U.S.)
	220VAC-9VDC 500 ma (Int'l)

Sample Water Requirements

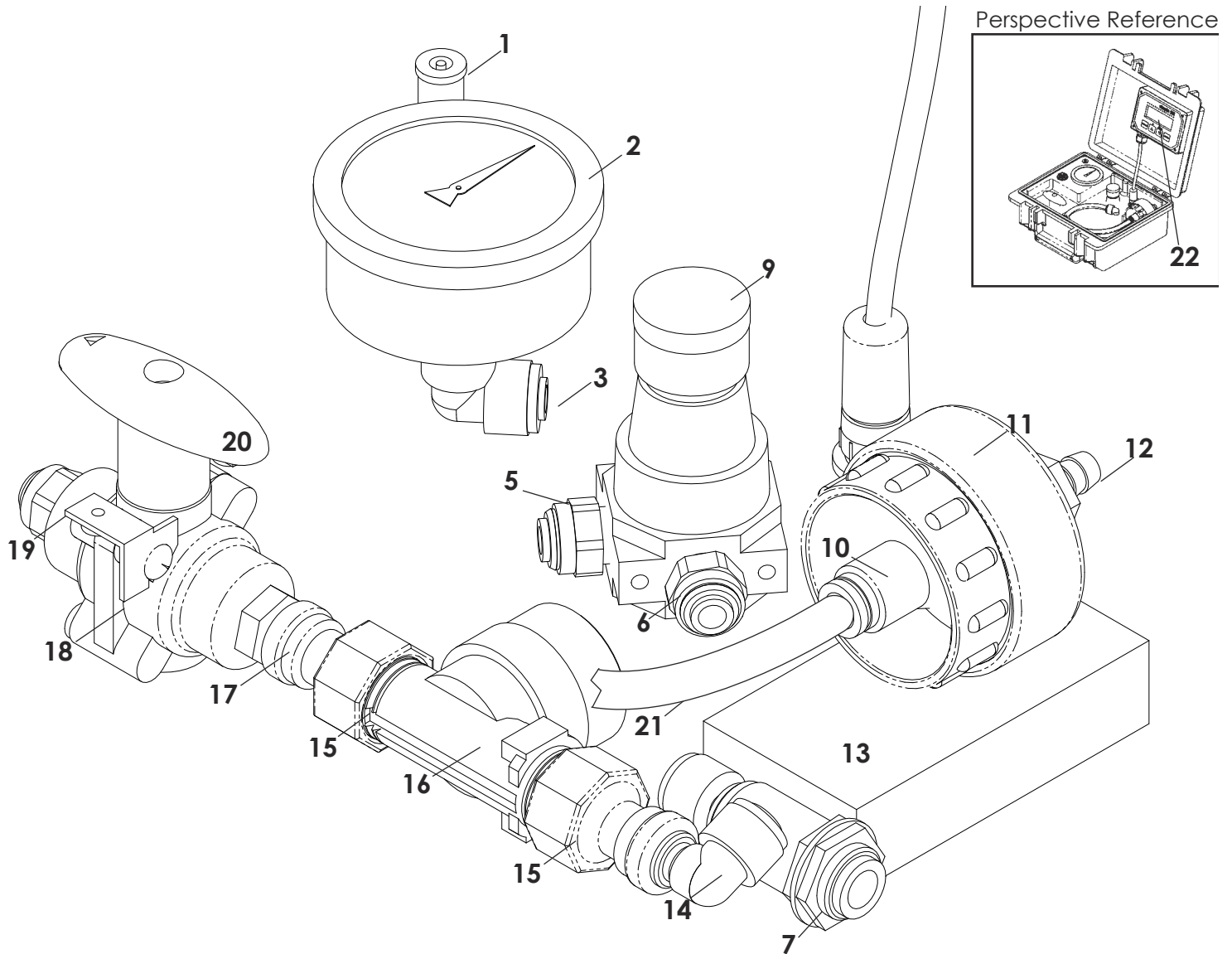
Feed Pressure	35 psi minimum, 100 psi maximum.
Minimum flow rate	1.4 Liters per minute at 35 psi at start of test. Flow decreases during test.
Temperature	100°F maximum. (max 1°F variation during test)
Solids	Free of large solids. Filter to 50 micron minimum.

Tests Performed

SDI₅	100 ml and 500 ml sample volumes
SDI₁₀	100 ml and 500 ml sample volumes
SDI₁₅	100 ml and 500 ml sample volumes

simple SDI:auto

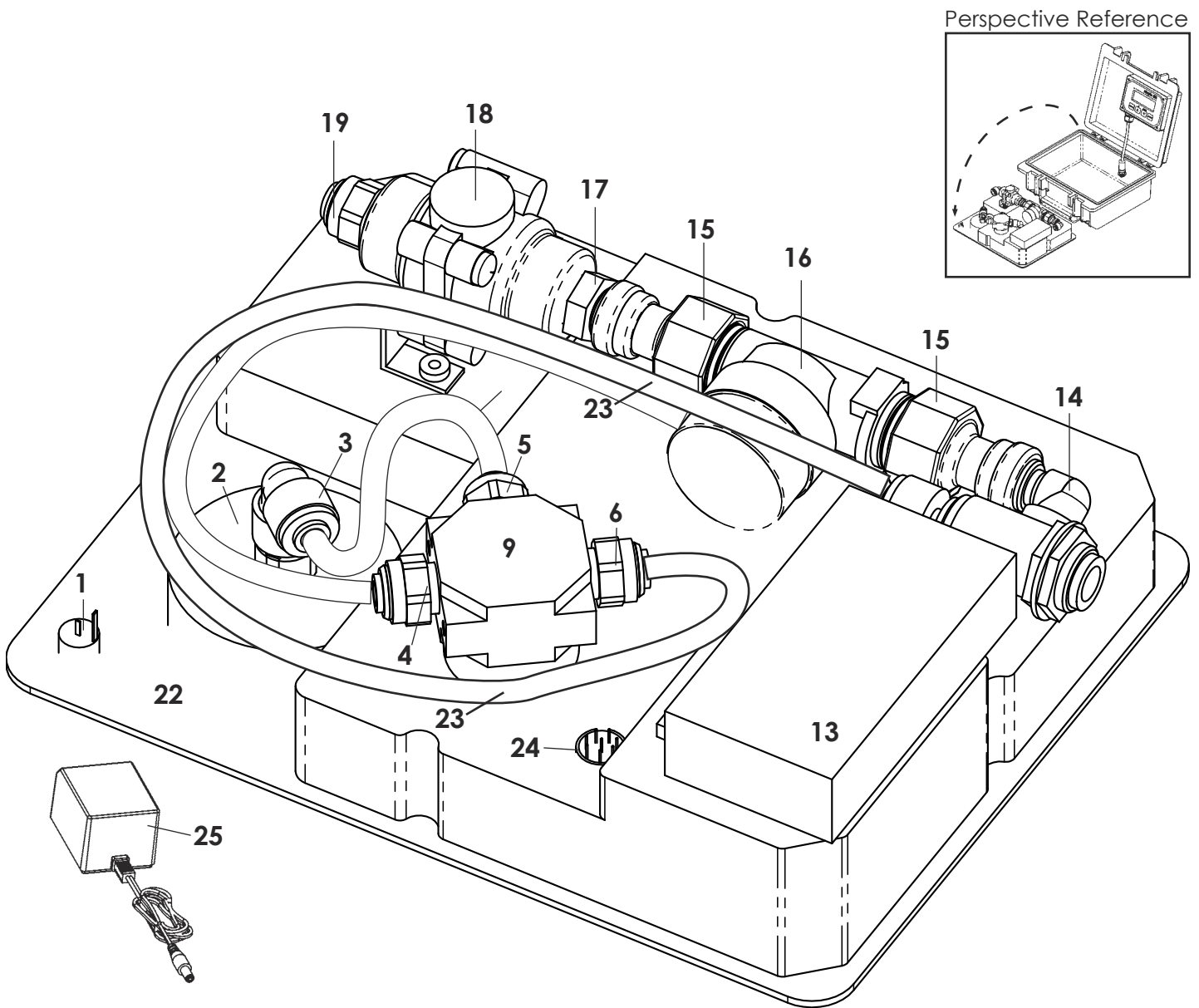
Isometric View with insert and case hidden.



Item Number	Part Number	Description
1	750-30105	DC Power Inlet Connector
2	530-20041	Gauge, 0-60 PSI
3	550-02106	Female Elbow, 1/4"
5	550-01102	Male Connector, 1/4" x 1/8"
6	550-01105	Male Connector, 1/4"
7	550-04110	Bulkhead fitting, 3/8"
9	560-01047	Pressure Regulator
10	540-40010	Tube Adapter, 1/4" x 3/8"
11	600-70200	Membrane Filter Holder
12	550-62176	Connector, Barb
13	182-11001	Battery, 6V

Item Number	Part Number	Description
14	550-09505	Elbow, Tube Stem, 1/4"
15	550-01256	Adapter, 1/2" BSP x 1/4" tube
16	530-90240	Flow Meter
17	550-08505	Tube Stem Adapter, 1/4"
18	520-12207	Ball Valve, 1/4" SMC
19	550-01105	Male Connector, 1/4"
20	800-10015	Handle, Teal SMC Valve
21	580-10010	Tube, 3/8" Blue PU
22	182-10060	Electronic controller assembly.

Bottom view with insert removed from case



Item Number	Part Number	Description
1	750-30105	DC Power Inlet Connector
2	530-20041	Gauge, 0-60 PSI
3	550-02106	Female Elbow, 1/4"
4	550-01105	Male Connector, 1/4"
5	550-01102	Male Connector, 1/4" x 1/8"
6	550-08510	Male Connector, 1/4"
9	560-01047	Pressure Regulator
13	182-11001	Battery, 6 V
14	550-09505	Elbow, Tube Stem, 1/4"
15	550-01256	Adapter, 1/2" BSP x 1/4" tube

Item Number	Part Number	Description
16	530-90240	Flow Meter
17	550-08505	Tube Stem Adapter, 1/4"
18	520-12207	Ball Valve, 1/4" SMC
19	550-01105	Male Connector, 1/4"
22	570-70100	Insert
23	580-10005	Tubing, 1/4" Black PU
24	751-01110	Cable Assembly, Insert
25	182-11005	Charger/Power Supply 110v
25	182-11006	Charger/Power Supply 220v

simple SDI: Limited Warranty

What the warranty covers:

Applied Membranes warrants the simple SDI meter to be free from defects in materials and workmanship during the warranty period. If a product proves to be defective during the warranty period, Applied will at its sole option repair or replace the product with a like product. Replacement product or parts may include remanufactured or refurbished parts or components.

How long the warranty is effective:

The simple SDI meter is warranted for one (1) year for parts and labor from the date of the first consumer purchase or 15 months from ship date, whichever comes first.

What the warranty does not cover:

1. Damage, deterioration or malfunction resulting from:
 - a. Accident misuse, neglect, fire, water lightning or other acts of nature, unauthorized product modification or failure to follow instructions supplied with the product.
 - b. Repair or attempted repair by anyone not authorized by Applied
 - c. Any damage of the product due to shipment.
 - d. Causes external to the product such as electric power fluctuations.
 - e. Use of supplies or parts not meeting Applied's specifications.
 - f. Normal wear and tear.
 - g. Any other cause which does not relate to a product defect.
2. Transportation costs necessary to obtain service under this warranty.
3. Labor other than factory labor.

How to get service:

1. To obtain warranty service, contact Applied Membranes for a Return Material Authorization (RMA).
2. You will be required to provide:
 - a. The serial number of your meter
 - b. Your name and address
 - c. A description of the problem
3. Package the meter carefully for shipment and return the meter to Applied, freight prepaid.

Limitation of implied warranties:

There are no warranties, expressed or implied, which extend beyond the description contained herein including the implied warranty of merchantability and fitness for a particular purpose.

Exclusion of damages:

Applied's liability is limited to the cost of repair or replacement of the product. Applied shall not be liable for:

1. Damage to other property caused by any defects in the product, damages based upon inconvenience, loss of use of the product, loss of time, loss of profits, loss of business opportunity, loss of goodwill, interference with business relationships or other commercial loss, even if advised of the possibility or such damages.
2. Any other damages, whether incidental, consequential or otherwise.
3. Any claim against the customer by any other party.

Effect of state law:

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Some states do not allow limitations on implied warranties and/or do not allow the exclusion of incidental or consequential damages, so the above limitations and exclusions may not apply to you.