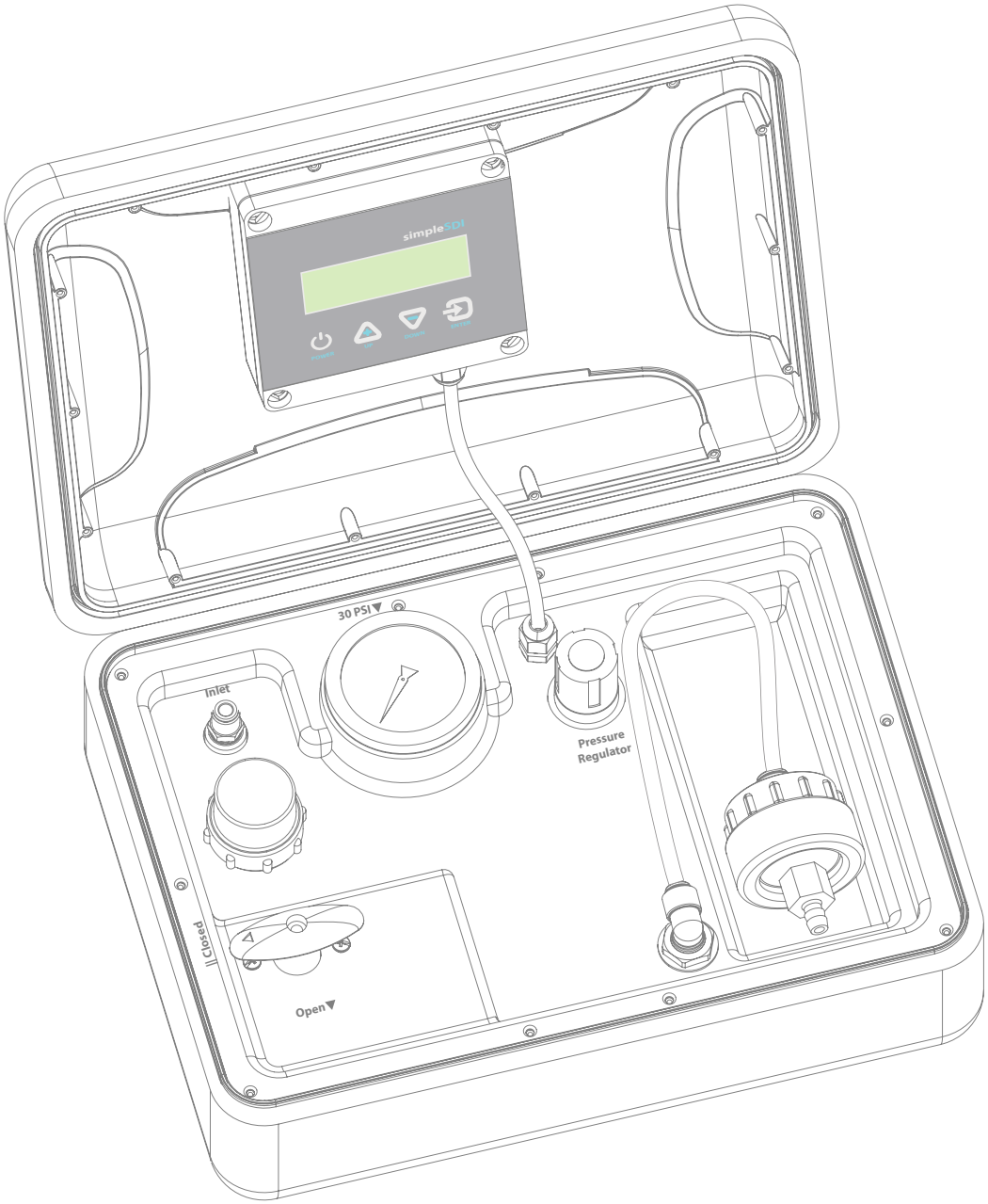
simpleSDI



Operators Manual

Released April, 2020

simpleSDI

Distributed by:
Accepta Ltd
Unit 15, Tarran Road
Moreton
Merseyside, CH46 4TU
United Kingdom

Welcome!

Thank you for purchasing our **simpleSDI 2.0** silt density index test instrument.

After nearly 20 years since the original simpleSDI instrument, we've completely redesigned the instrument to make it more reliable, more accurate and added new features.

- **New** Lithium Polymer battery for more tests per charge, lighter weight and longer life.
- **New** built-in prefilter to ensure that the flow sensor is protected from particulates.
- **New** dual pressure regulator design provides safe operation up to 100psi and improves accuracy by regulating the pressure to the test regulator.
- **simple SDI** uses ASTM D4189-14 compliant .45 micron, 47 mm, MCE membranes for standards compliance and consistent test results.
- **simple SDI** is housed in a rugged crush-proof case. No flimsy tissue-thin plastic here.

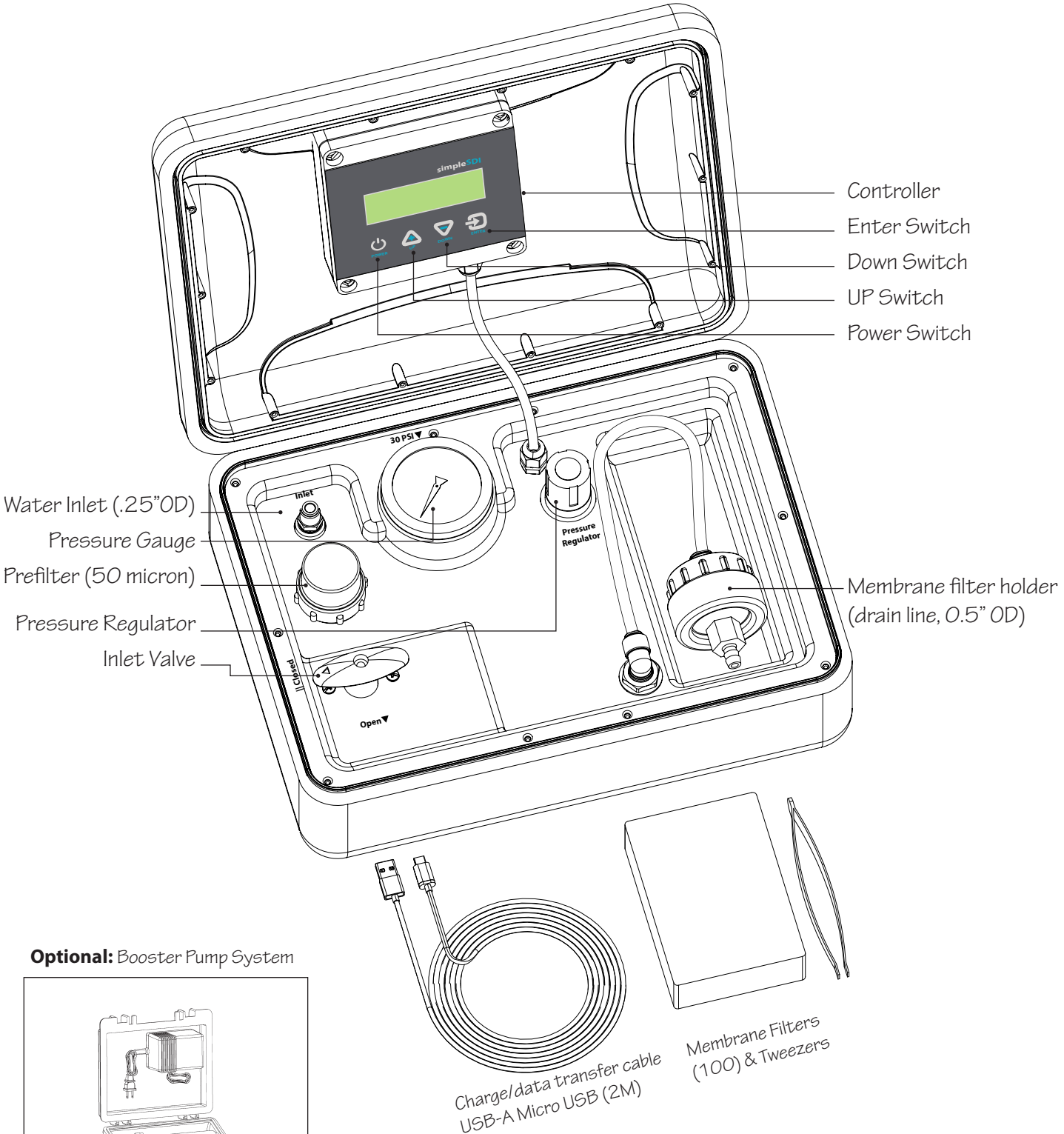
Again, thank you. Welcome to the community of simpleSDI users.

Cautions and Advisory Notes

To ensure years of trouble-free service, please observe the following cautions and advice:

- **Always use the built-in prefilter.** This assures that the flow sensor is protected from particulates that could damage it.
- **Never blow air through the instrument**. Doing so will damage the flow sensor.
- **Do not exceed 2 LPM flow** when starting up or flushing the instrument.
- **Don't leave the instrument exposed to direct sunlight or high temperatures.**
- **Rinse the instrument with clean water after testing on Seawater or High Salinity water.**
- **Charge the battery frequently.** To protect the battery from damage, the controller will turn off when the batttery charge reaches 20%.

Getting to know simpleSDI: Overview

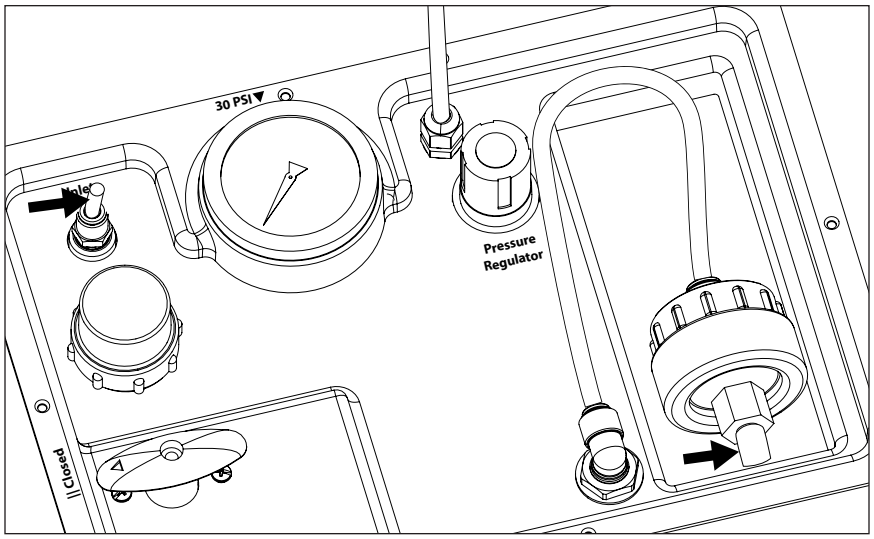


Optional: Booster Pump System

Setup and Startup.

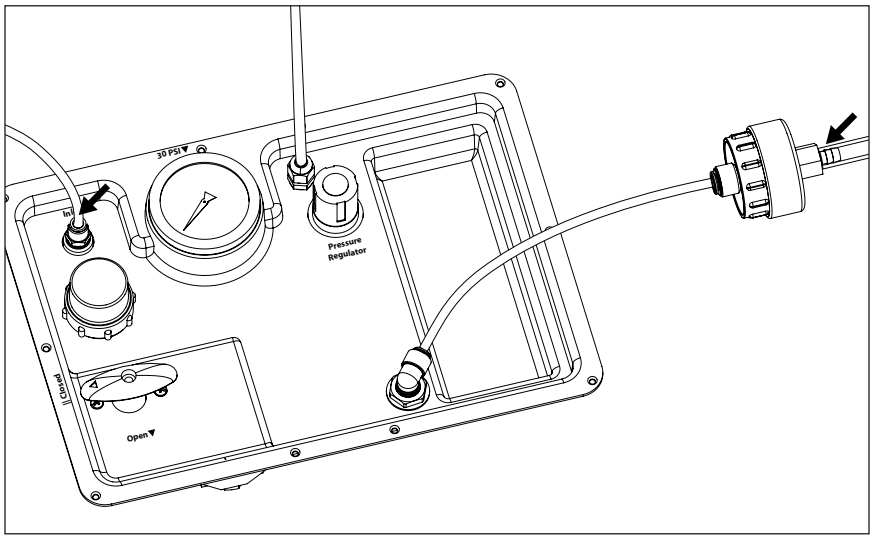
Setup-1

- Remove plug from inlet fitting and cap from membrane outlet.
- Close simpleSDI inlet valve.



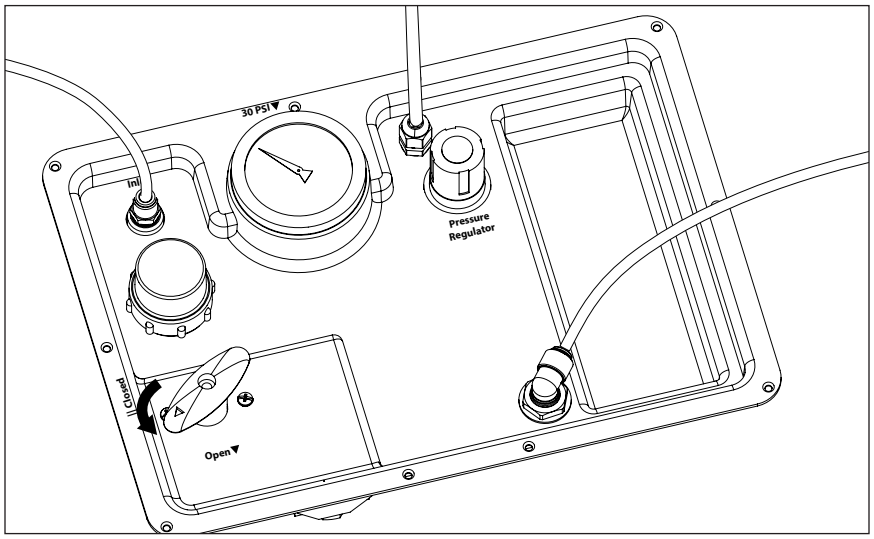
Setup-2

- Connect water supply line, turn supply on.
- Connect hose to membrane outlet, route to drain.



Startup

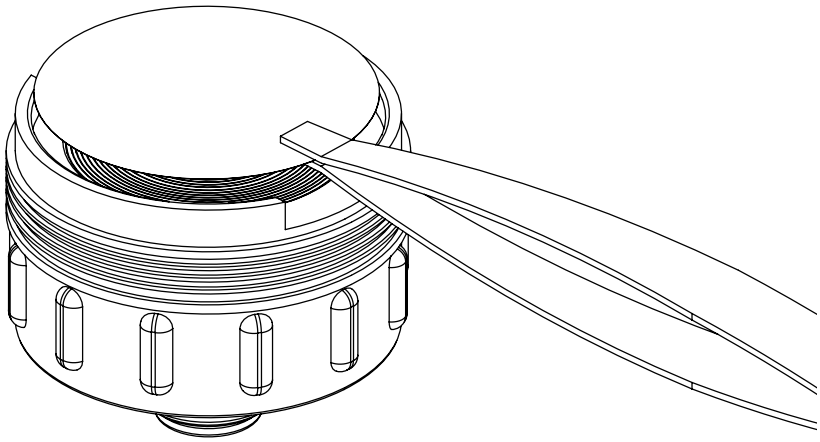
- Partially open the inlet valve, just enough to allow approximately 1LPM to flow through. Do not exceed 2LPM or the flow sensor may be damaged.
- Allow the water to flow for a short period. Close and open the inlet valve several times to dislodge air bubbles.
- Tapping on the inlet valve handle or regulator and opening and closing the regulator may also help.
- When the air has been removed, and there are no air bubbles, close the inlet valve.



Test Procedure, filter installation

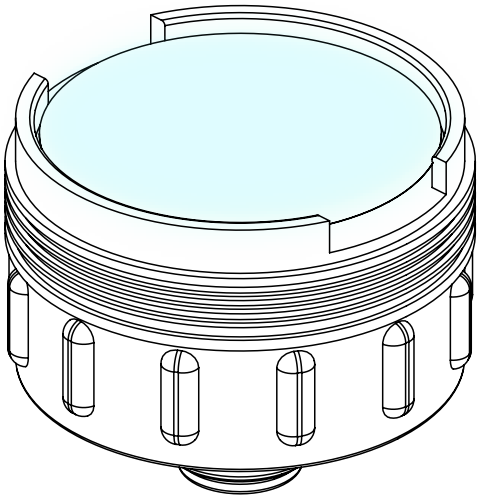
Membrane Filter installation

- Open the membrane filter housing.
- Tilt the filter housing UP so that the face of the housing is 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.) The "shiny" side of the membrane should be placed "UP".



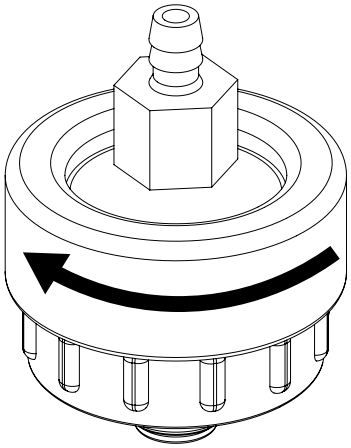
Wetting the Membrane Filter

- Open the inlet valve very slightly so that water slowly comes up out of the housing. Close the valve while keeping the filter housing face up and parallel to the ground. Allow the membrane to absorb water and become fully wetted.



Assemble and Tighten the Housing

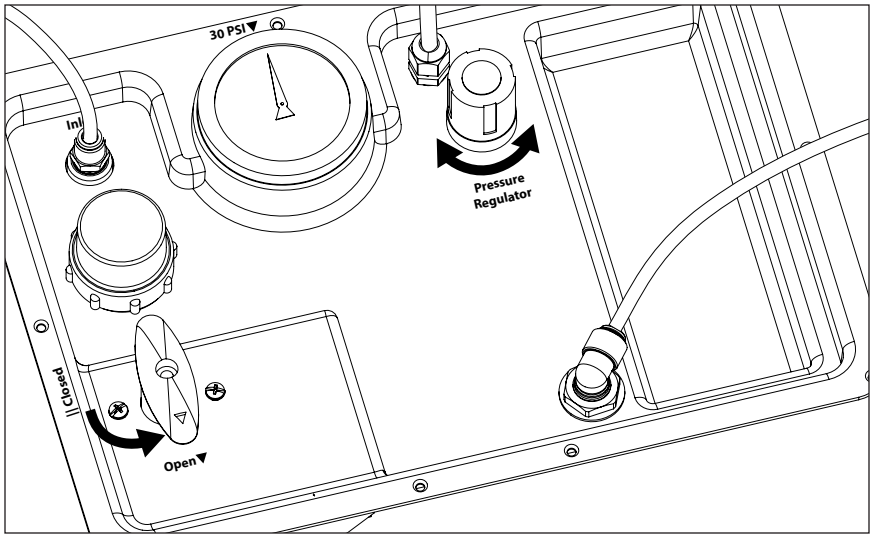
- Once the membrane has been wetted thoroughly, put the top back on the membrane filter housing and tighten fully.



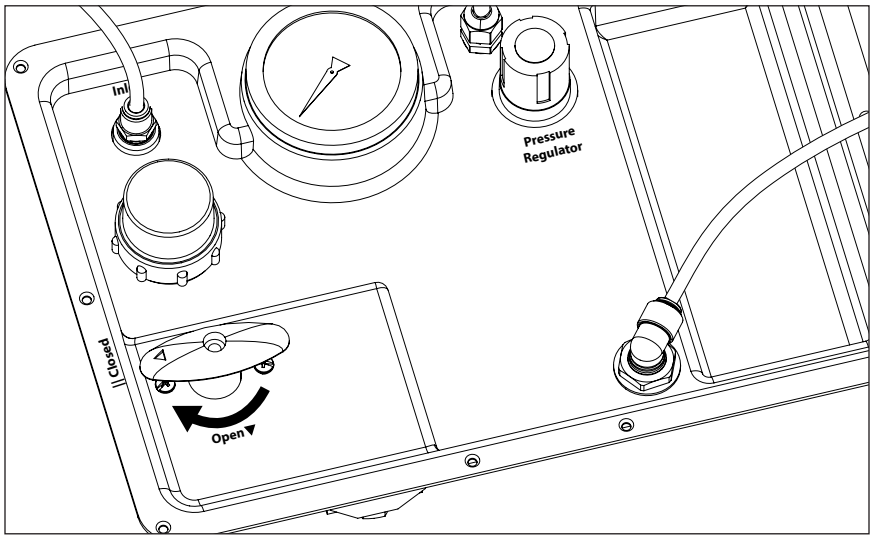
Test Procedure, pressure adjustment

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.)



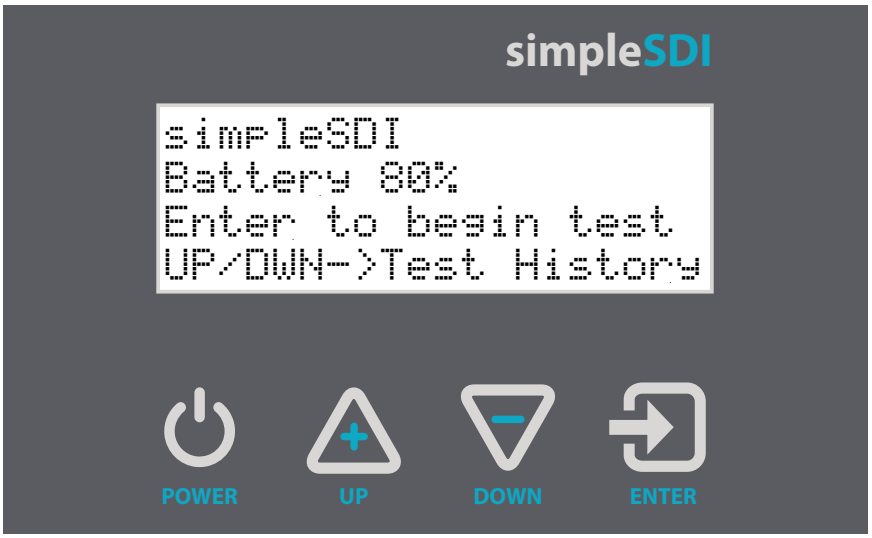
- As soon as you reach 30 psi, close the inlet valve.
- This procedure is only necessary on the first test on a given water supply. On subsequent tests the pressure can be adjusted, if necessary, during the first few seconds of the test.
- You're ready to begin the test.



Test Procedure

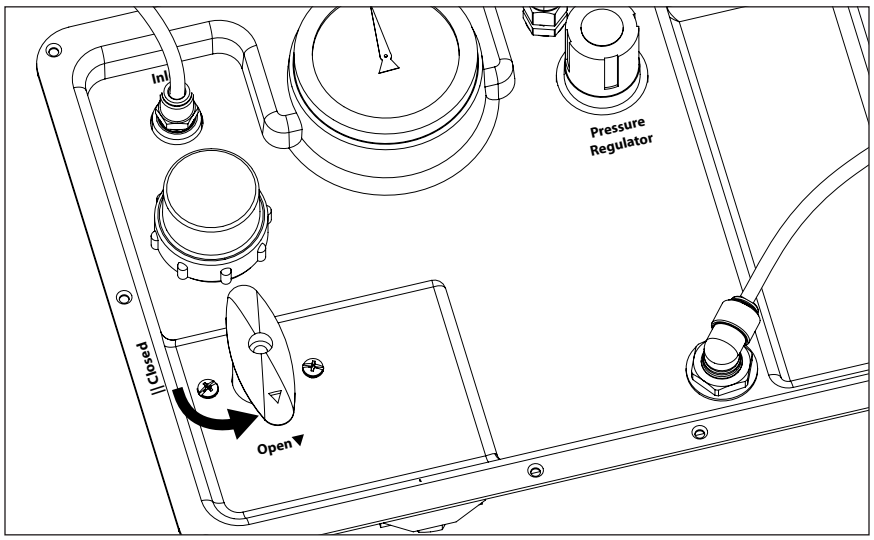
Start the test

- Turn the Power ON.
- After the Welcome screen comes up, Press ENTER to begin the test.



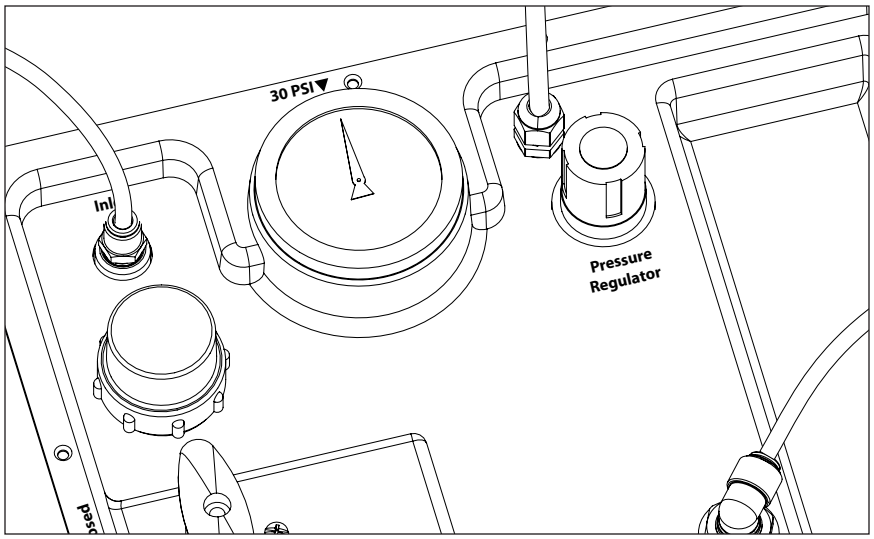
Start the test

- OPEN the inlet valve. As soon as the water starts flowing, the test will begin automatically.



Accuracy tip.

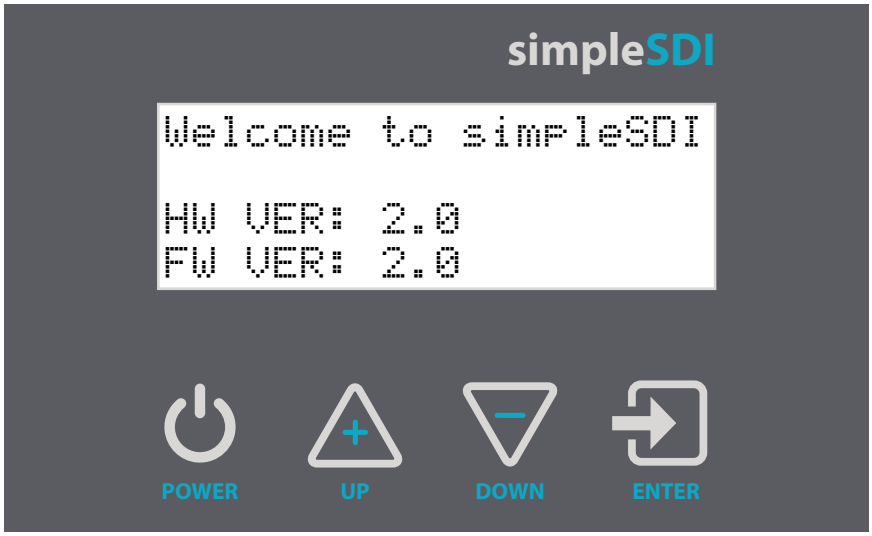
- During the first 3-4 minutes, adjust the pressure as needed to maintain 30psi.
- After the first 4 to 5 minutes the pressure will stabilize. The test will take approximately 20 minutes to complete.
- SEE PAGE ## for explanations of test results.



Controller Operation and Test Results

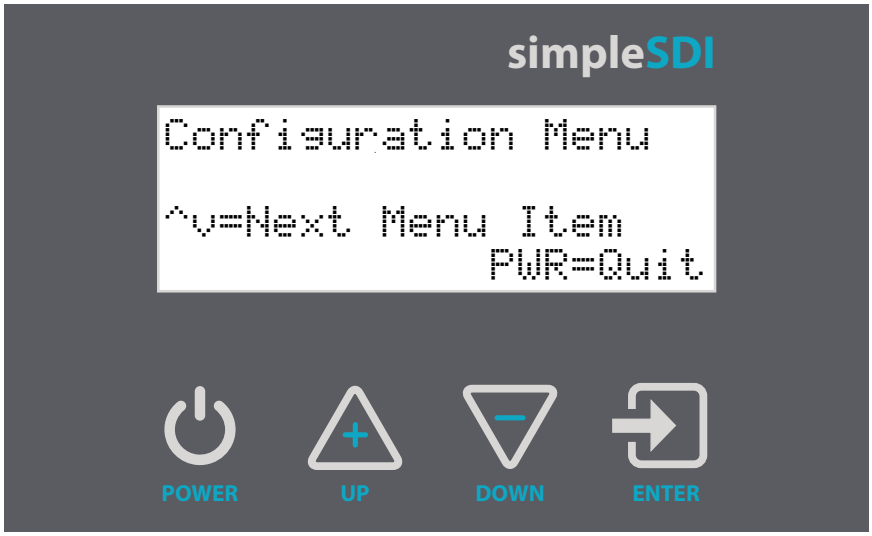
Initial Power Up Screen

- This screen displays for 5-6 seconds on power-up.
- While this display is ON, pressing the power button a second time opens the configuration menu for making date, time and other settings



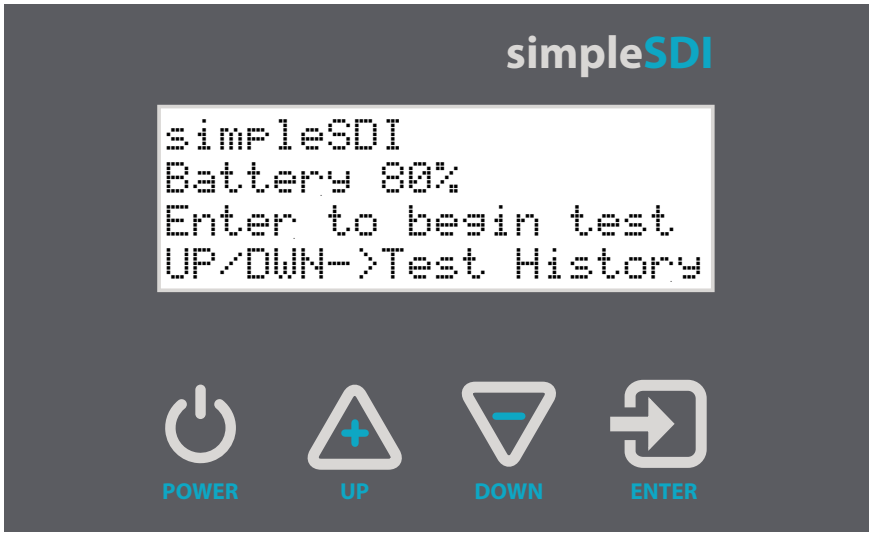
Configuration Menu

- Follow the menu prompts to adjust the date, time, other settings.



Normal Home Screen

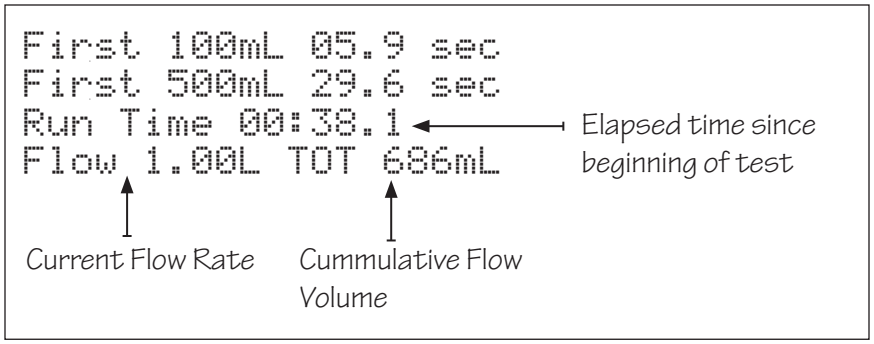
- This the normal home screen.
- You will begin a test from this screen by pressing the ENTER button.
- Pressing the UP or DOWN button will scroll through the test history.
- The most recent test is the lowest number. Each test has a Date and Time record.
- The controller stores 100 test records.



Controller Displays Explained: *Test In Process*

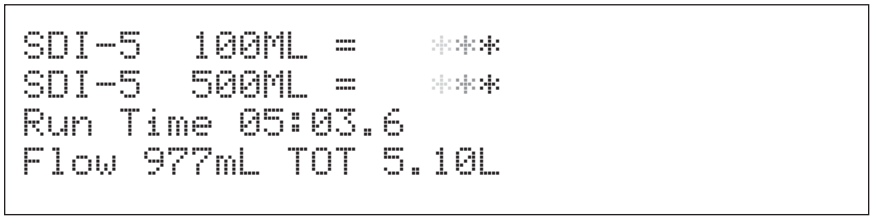
Initial Flow Measurement Screen

- The SDI test begins with measuring the time it takes to flow 100ml and 500ml through the membrane filter (Ti). This value is the basis for calculating SDI-5, SDI-10 and SDI-15.



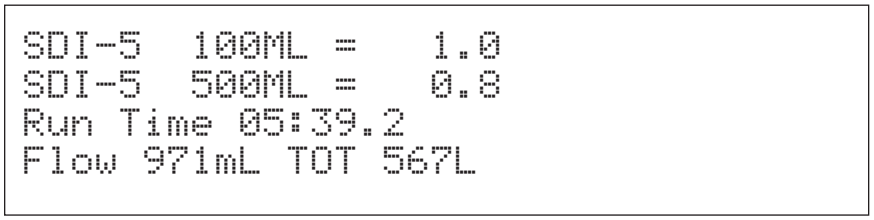
SDI-5 Measurement in Process

- The screen will show * * * moving from left to right while the measurement is being made.



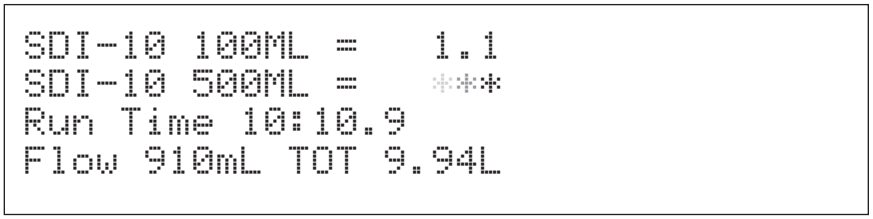
SDI-5 Measurement Complete

- When the flow measurement is complete the controller calculates and displays the SDI-5 100ml and 500ml values.



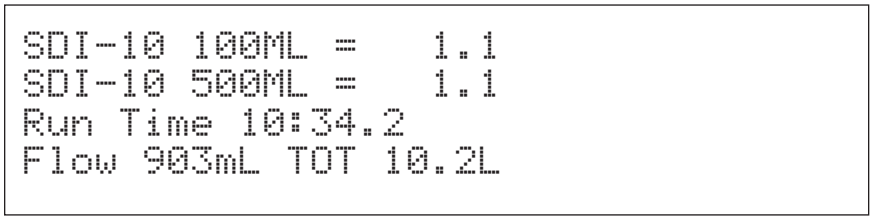
SDI-10 Measurement in Process

- The SDI-10 measurements is the same as the SDI-5 measurement above.



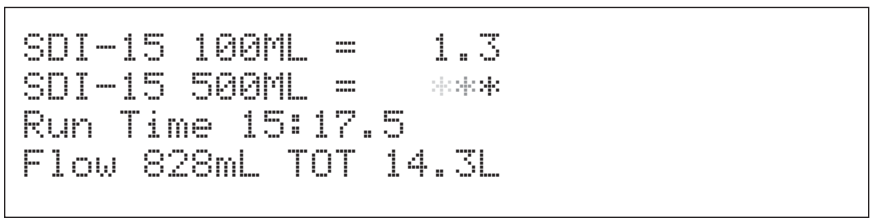
SDI-10 Measurement Complete

- When the flow measurement is complete the controller calculates and displays the SDI-10 100ml and 500ml values.



SDI-15 Measurement in Process

- At the end of the test, the controller displays the results for the SDI-5, SDI-10 and SDI-15 tests.



Controller Displays: *Test Complete & Error Messages*

Normal End of Test Display

- The SDI test results for SDI-5, SDI-10 and SDI-15 in both 100ml and 500ml sample size are displayed at the end of the test.
- This test completed successfully within normal parameters.

```
Results:  100 / 500mL
SDI-5     1.0 / 0.8
SDI-10    1.1 / 1.1
SDI-15    1.3 / 1.3
```

Error Messages

SDI Result with > 75% plugging

- The test shown here had >75% plugging during the SDI-10 and SDI-15 tests. An SDI value that results in a plugging factor > 75% is considered too high to operate an RO successfully. These results are indicated with a ! next to the SDI result.

```
Results:  100 / 500mL
SDI-5     6.0 / 7.6
SDI-10    6.6 / 7.6!
SDI-15    5.5!/ 5.8!
```

Error, Test Time Exceeded

- On high fouling waters, it is possible to take longer than 5 minutes to collect the 500ml sample. If this occurs during the SDI-5 or SDI-10 test the test can not be completed. To indicate this we display =T>5 (Time>5 minutes).

```
Results:  100 / 500mL
SDI-5    18.7!/=T>5
SDI-10    9.4!/=T>5
SDI-15    6.2!/ 6.2!
```

Error, Flow Increase Before Test

- If the flow increases by 10% or more after the initial time measurement and before the SDI-5 tests begins, testing stops and this error message is displayed.

```
Flow Increase > 10%
Check for leak
or torn membrane.
```

Error, Flow Increase During Test

- During the SDI test, the flow should decrease. An increase in flow indicates a torn membrane, a leak or an air bubble. If the flow increases by 10% or more after the SDI-5 test begins, ^Flow is displayed in the field where the error occurred. Testing stops and later fields are filled with -----

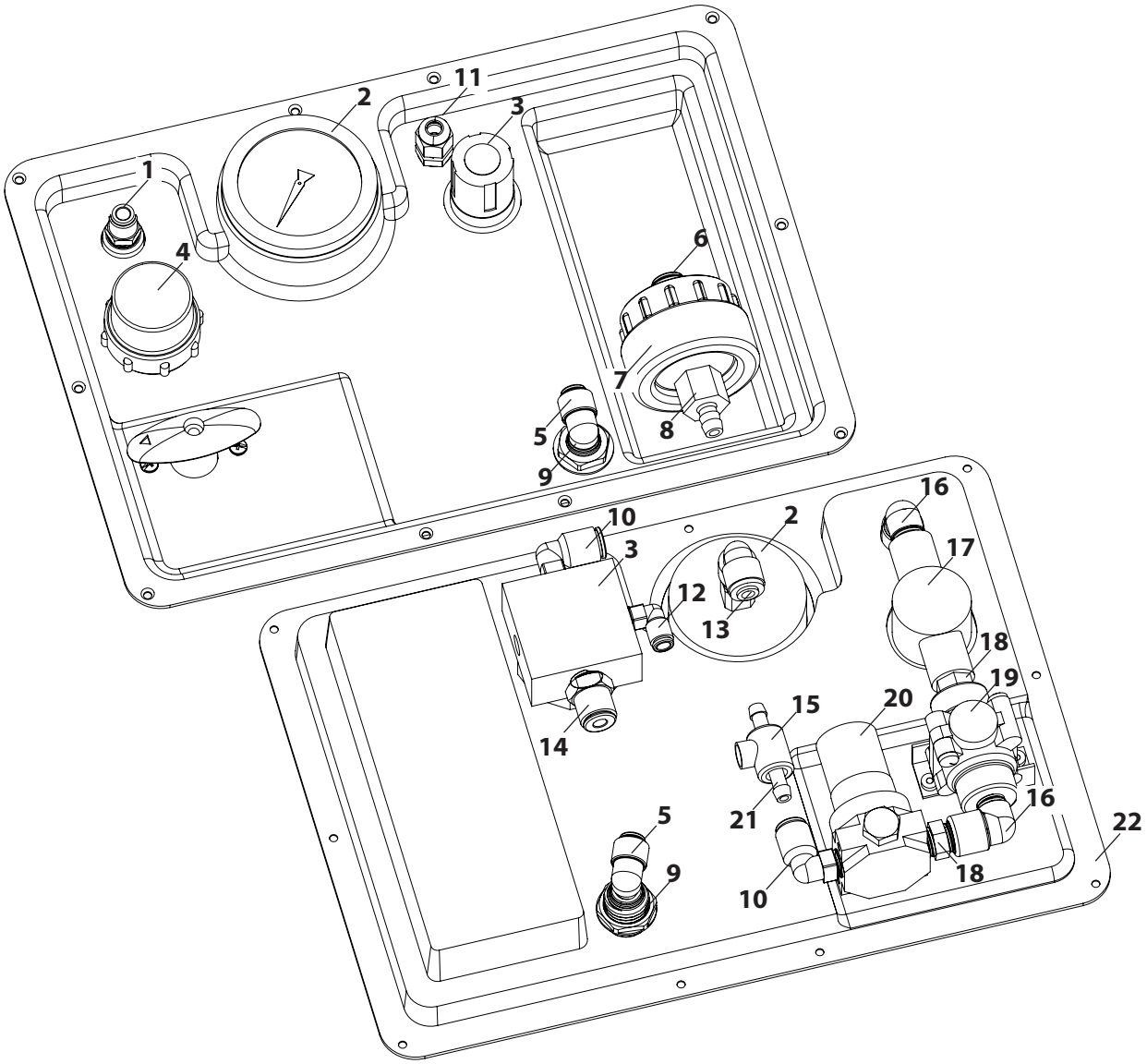
```
Results:  100 / 500mL
SDI-5     6.0 / 7.6
SDI-10    6.6 /^Flow
SDI-15  -----/-----
```

Error, Insufficient Flow to Start Test

- If the initial flow isn't greater than 200ml/min, the test can not be performed and this message is displayed.

```
Initial flow test
failed. Check test
pressure, membrane &
pre-filter.
```

Parts Indentifcation



Ref #	Part #	Description	Ref #	Part #	Description
1	551-65051	Connector, Male, 1/4 MPT x 1/4 PtC	**12**	551-65791	Elbow, Male, 1/4 MPT x 1/4 PtC
2	530-20070	Gauge, 2 1/2 316SS dry 0-60 CBM	**13**	550-02106	Elbow, Female, 1/4 FPTx 1/4 PtC
3	560-01047	Regulator, Pressure 0-60PSI	**14**	551-65052	Connector, Male, 1/4 MPT x 3/8 PtC
4	182-30059	Filter Element, 50micron, PE	**15**	530-90255	Flow sensor with cable-Current
5	551-65383	Elbow, Stem, 3/8 Stem x 3/8 PtC	**16**	550-0904	Elbow, Street, 1/4", Black PP
6	550-01207	Adapter, Female, 1/4 FPT x 3/8 PtC	**17**	182-3514	Filter base, 1/4 x 1/4 FPT GFPP
7	600-70200	Membrane filter holder, MFS	**18**	550-0250	Nipple, Short 1/4", Black PP
8	550-62176	Adapter, 1/4 FPT x 3/8 Barb PP	**19**	520-12207	Ball valve, SMC 1/4 F PVC-EPDM
9	551-63162	Bulkhead, 3/8" PtC	**20**	560-2125	Regulator, Pressure 0-125PSI
10	551-65793	Elbow, Male, 1/4 MPT x 3/8 PtC	**21**	530-90296	Flow Sensor, Tube only PVDF
11	740-1212	Cable Gland, M12-1.5	**22**	570-7100	Insert, 2.0

EC Declaration of Conformity

| Electromagnetic Compliance 2014/30/EU
| Low Voltage 2014/35/EU

The devices defined below have been developed, constructed and manufactured according to the above mentioned EU directives. The applied harmonized standards are noted below.

Product Description
Product Name: simpleSDI
Product Type: Portable, battery powered silt density index testing tool.
Manufacturer: Spears Design and Consulting Inc.

Product Environment:
This product is intended for use in commercial and light-industrial environments.

Applicable Directives
Emission: EN 61000-6-3:2007/A1:2011
Immunity: EN 61000-6-1:2007

Declaration Issued April 23, 2020

Spears Design and Consulting Inc.

David Spears
Technical Director

Specifications

Dimensions

Inch (mm)

Wide	Deep	High
14.0 (356)	11.25 (286)	4.75 (121)

Weight 6 pounds, (2.7kg)

Electrical

Battery Type: 6 Volt, 3000 mAH Lithium Polymer (LiPo)

Battery Life: At least 5 years of typical usage. (Over 300 full charge cycles)

Battery Capacity: Approximately 30 hours of testing.

Power Supply: 5VDC, USB-A Port charger, (e.g. phone, tablet or other device charger (user supplied))

Sample Water Requirements

Feed Pressure 35 psi minimum, 100 psi maximum. (Booster pump available.)

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

SDI_5	Range: 0-20	100ml and 500 ml sample volumes
SDI_{10}	Range: 0-10	100 ml and 500 ml sample volumes
SDI_{15}	Range: 0-6.7	100 ml and 500 ml sample volumes

Applicable Standard **ASTM D4189-07 (2014)**

simpleSDI: Limited Warranty

What the warranty covers:
Applied Membranes Inc. (AMI) warrants the simpleSDI 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, AMI 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 simpleSDI 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 AMI
    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 AMI'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 AMI 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 AMI, 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 merchantablility and fitness for a particular purpose.

Exclusion of damages:
AMI's liability is limited to the cost of repair or replacement of the product. AMI 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.