2100 Series

Portable Automatic Water Sampler

Installation and Operation Manual

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Caution! Once you receive your sampler and it is unpacked. Place the unit in an upright position for at least four hours to allow the compressor oil to settle before applying power to the unit. Failure to do so can damage the unit and is not covered under warranty.

Introduction：

The Spectra 2100 Series Portable Automatic Water Sampler has been designed to offer the user a wide range of options in a specialized environmental monitoring instrument. The unit uses a 12 VDC power source and can be operated using a 230/120 VAC to 12 VDC power supply, 12 VDC battery or 12 VDC battery\solar panel package for remote location sampling. The 2100 Series incorporates a temperature-controlled sample storage chamber that utilizes both refrigeration and heating to maintain sample temperature requirements. The pump enclosure contains a second heating system that protects the pump and pump tubing and associated electronics from freezing when the sampler is used during cold-weather operation. There is no need for ice or to stop monitoring when outdoor temperatures go below freezing. The Model 2100 uses a peristaltic pump design for liquid draw. The unit is controlled by a single-microchip computer. Fully programmable, the user can set sampling time interval, sampling quantity and sampling mode as well as other application parameters according to their requirements. The 2100 series utilizes a time-based sampling mode and can also be used with a flow sensor input (optional) to accomplish volume-based sampling.

Specifications:

1. Sampling Method：

Composite sampling：

Sampling delay time: Any setting of 1-9999 minutes with increments of 1minute.

Sampling interval time: Any setting of 1-9999 minutes with increments of 1minute.

Sampling volumes：50～7000 ml with increments of 1 ml.

Number of mixed samples：1-200

2. Refrigeration: Compressor Based

3. Heating: Dual Zone, two channel controller, programmable setpoints (sample chamber and pump\electronics housing. Proprietary Aluminum\ Ceramic heater with air handler

5. Characteristic of Peristaltic Pump：0.9 GPM (3.4L/min), suction height 9.8 ft (3m); 0.58 GPM (2.2L/min.) suction height 19.7 ft. (6m)

6. Sampling Error：±8%

7. Repeat Sampling Accuracy：±5ml8. Vertical Head：26.25 ft. (8m)

9. Horizontal Suction Head: 164 ft. (50m). Pump has a programmable automatic air purge function.

10. Sampling Bottle：1 x 1.65 gallons (7500ml) Polyethylene bottle

11. System clock time control error: △1≤0.1% and △24≤30S

12. Air tightness of pipeline system: ≤-0.05 Mpa

13. Mean Time Between Failure (MTBF): ≥1440h/time

14. Insulation Resistance: >20MΩ

15. Software lock to protect programs from being changed.

16. Save a maximum ten programs for ease of use.

17. Sampler will auto-record and save sample history. The stored data is kept when the power off.

18. Working temperature：-25ºF (-31.6ºC to 122ºF (+50ºC).

19. Power： 12V DC, 102W (with all systems running, compressor, heaters X2 and pump)

20. Size：22.8” (580mm) (L) x 12.6” (320mm) (W) x 20.5” (520mm) (H)

21. Weight: 32.25 lbs. (15Kg)

Locating the Sampler:

1. Select a location on level surfaces when possible.
2. Avoid areas where wet or soggy ground or standing water is found.
3. Be aware of locations that may flood or collect water during storm events at the sampler location.
4. Use a secondary enclosure if the sampler is to be left in place for extended periods of time.

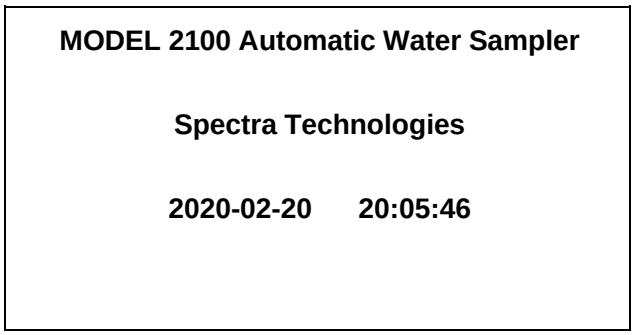
Installation Precautions：

1. When transporting the sampler always use both handles at the same time.

2. When placing the sampling bottle, be sure to press the sampling bottle to the bottom to prevent dispenser tuber from colliding with the top of sampling bottle and not working properly.
3. Pump tube should be checked regularly and replaced at once if damaged. Leave a gap of 2mm between the pump tube and the pump housing.
4. If the sampler does not operate properly, turn of the power, and notify the manufacturer.
5. If the pumping accuracy does not meet the setting parameter, the user can adjust the volume being drawn to improve the accuracy of the sample. For more details, please refer to pumping parameter settings.

Programming Guide：

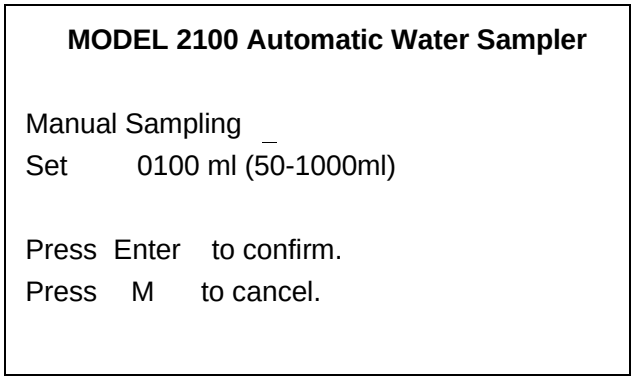
After system is on, the display will show the following：



With the above display Press ↑（up) to make the pump rotate forward. Press ↓ (down) to make the pump rotate in the reverse direction.

1. Manual Sampling

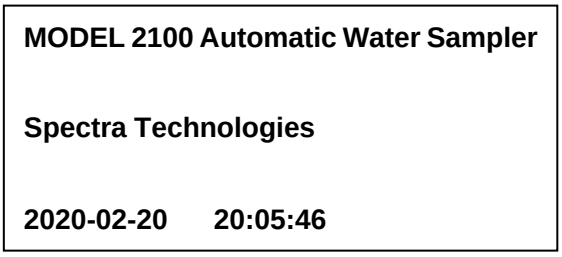
When in startup display, press→（right） to enter Manual sampling mode：



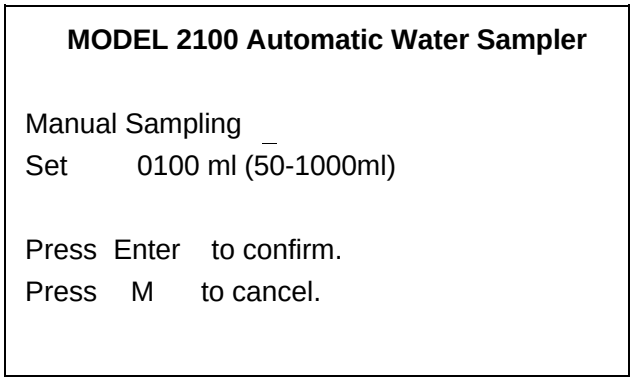
Press ←（left) or → (right) to move cursor. Press ↑（up） or ↓（down) to increase or decrease number by 1. After setting the desired volume, press Enter ↲（Enter) to save the setting. Press (M) to cancel. Use the same procedure for each parameter.

3. Continuous Sampling

From the main startup screen.



Press the Tab down key. You will see the following screen.



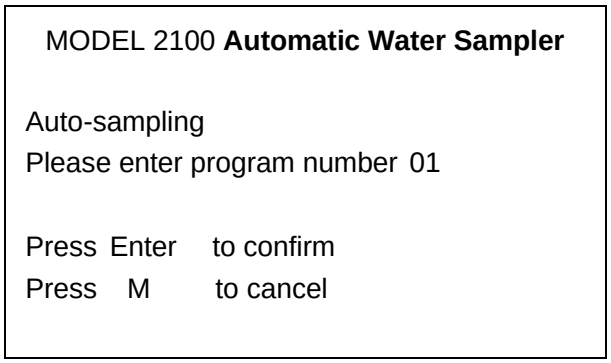
Enter the desired sample volume then press the ↲ **(Enter**) key twice. This will override any sample mix number that was programmed previously and will allow the sampler to run continuously until either the Menu key or Enter key is pressed.

Note: When in the Continuous Sampling mode, the sampler will continue to operate. Failure to empty the sample bottle will cause it to overflow.

4. Automatic Sampling Parameter Setting

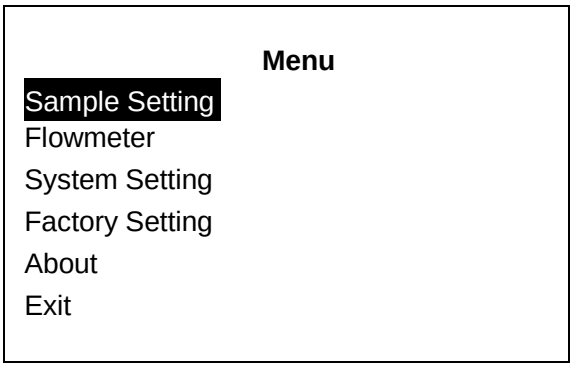
Automatic Sampling

Press ↲（Enter under start-up interface to enter automatic sampling mode:

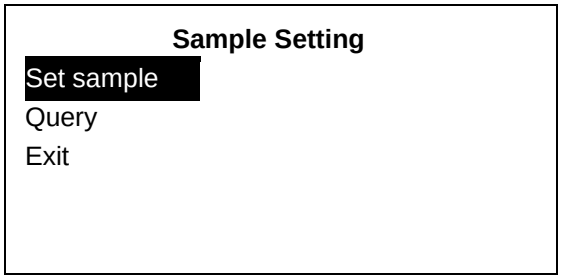


Select required program number then press ↲ (Enter) go to Auto-sample model. Press M button to cancel.

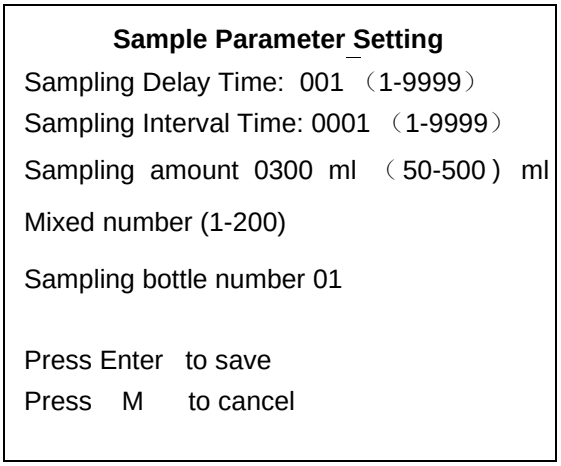
Menu: Press **M** to enter main menu （Press M again go back to start-up interface）



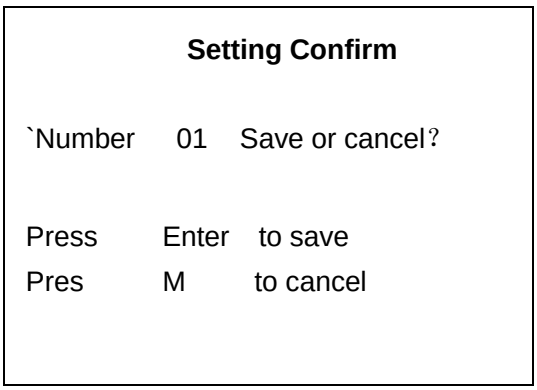
Select “Sample Setting”



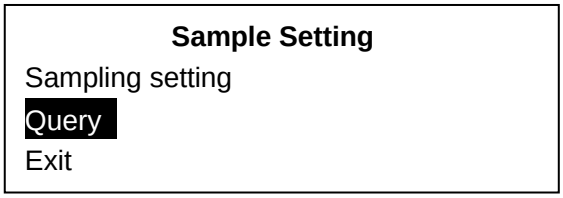
Press ↲（Enter) to sample parameter setting interface：

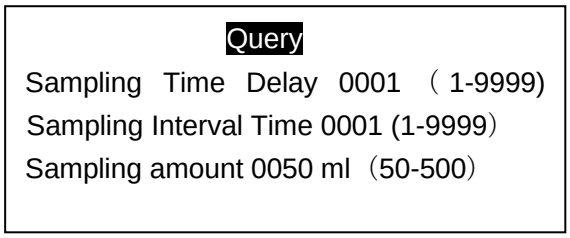


To cancel setting, press M, going back to “Menu.” To save the setting press ↲（Enter). As below：



The Sampler can save and install up to ten preset programs. After setting, select “Query” to find the preset programs parameters.





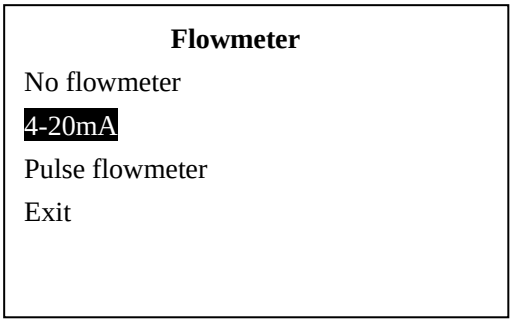
5. Flow Paced Sampling

The input terminal for Flow Paced sampling is found on the right side of the pump enclosure.

Input Terminal Pinouts

RS-232		Ground	Flowmeter		Pulse		Ground
1	2	3	4	5	6	7	8
Input	Output	4-20 ma -	4-20 ma +	+16 VDC	+	-	-

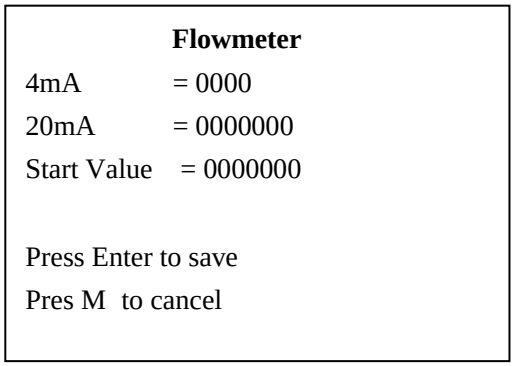
Press M on start-up interface. Press Tab down until you get to the Flowmeter interface, as shown:



Select the type of flowmeter output you need, **4-20mA** or **Pulse** and press Enter.

For 4-20 ma outputs set the 4 ma value and the 20 ma value.

Note: For this range, the units are dimensionless and will allow the sampler to be equal to whatever the full-scale value of the flowmeter is set to.



The Start value should be set to the number of units you want the sampler to take a sample at.

For example, if the 4-20 ma is set to 0 to 5000 units and the Start value is 1000, then the unit will sample every 1000 units.

For Pulse outputs Set the desired number of relay closures depending on the flowmeter setting for sampler output.

The Pulse input has been designed for use with flowmeters that have a dry contact sampler relay output feature. For Pulse output flowmeters set the number of pulses needed and press Enter.

Set number of pulses
Current = 0000000
Start Value = 0000000

Press Enter to save
Press M to cancel

When the circuit between terminal 6 and 7 closes a single pulse is generated.

When the relay from the flowmeter is activated, the sampler will then cycle and take the required sample.

Go back to the main menu, Press Enter from Startup screen, and select Automatic sampling mode and setup as the following:

MODEL 2100 **Automatic Water Sampler**

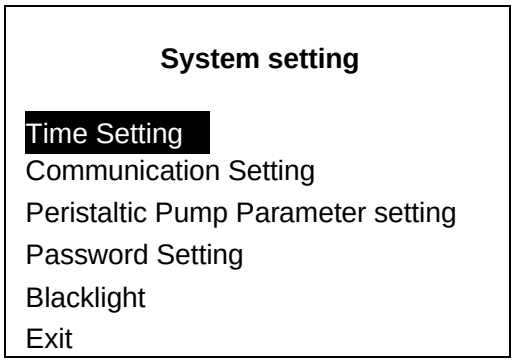
Auto-sampling
Please enter program number 01

Press Enter to confirm
Press M to cancel

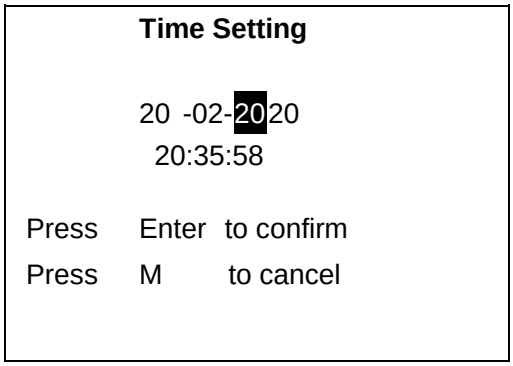
The sampler will now be in automatic sampling mode based on the programming of the input type.

6. Time Setting

At the Start-up display → System setting as below：

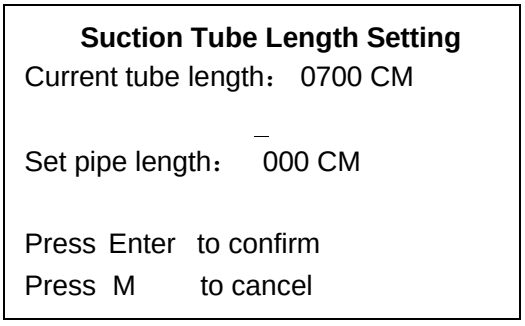


Press ↲（Enter) to Time Setting：



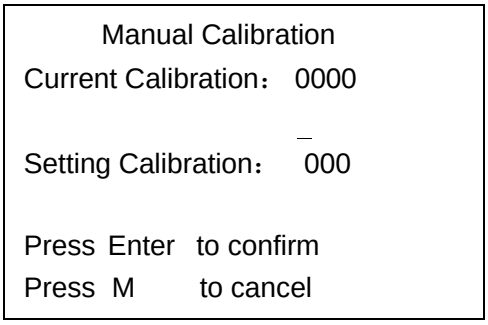
7. Suction Tube Length Setting

Go into Suction Tube Length Setting interface, select the normal length.



It the actual tube is longer or shorter than the pump tube provided, you should update the data.

8. Manual Calibration



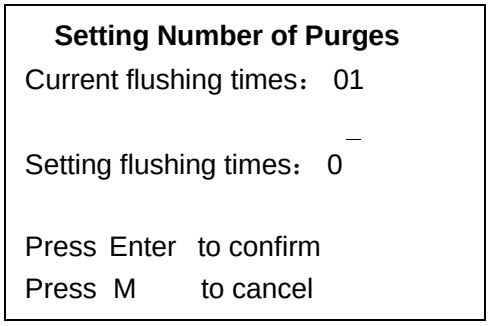
How to set the Calibration:

1. Set up the length of suction tube.

2. Press ↑（up) on the start-up interface to make the pump rotate forward. If there's water is dispensed then the set up was successful; Otherwise, continue to press ↑（up) until water is dispensed.

3. Repeat step 2 3 or 4 times. When the water output amount is stable, you can measure the amount and input the number to "Setting Coefficient." Press ↲（Enter) to save.

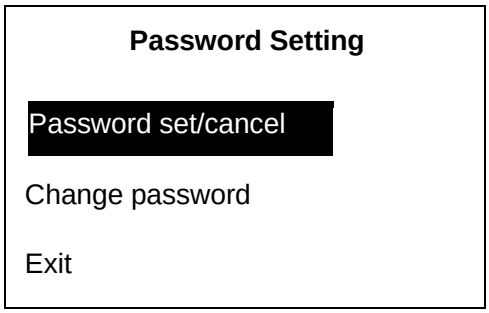
9. Number of Air Purges



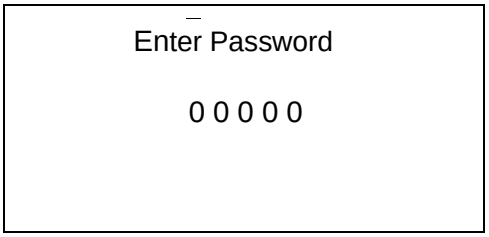
The number of air purges shows the number of backflushes before each sample cycle. This parameter can be set from 0-3 purges.

Note: When the sampler is going to be operated in ambient air temperature that are below freezing, it is recommended that the air purge number be set to 3.

10. Password Setting



As the above shows √ means password has been enabled. Press ↲ （Enter） to stop password enable state. Original
Password：123456. If you want to change password, go into the "Change password" interface：



11. Blacklight Time

Blacklight Time Setting
Current time set: 300
Setting time： 00
Press Enter to confirm
Press M to cancel

12. Refrigerator

A. Connect to the power and press ON/OFF key to run on. Now the “Power” light is on. The digital display will show the current temperature inside the chamber.

B. If the power is off or disconnected, the refrigerator will shut down automatically. But it will run in the mode set before when power returns.

C. Press △UP or ▽DOWN can set the temperature.

D. When continuously press “SET” until the display shows “ECO” or “HH,” you can set the refrigerator to run in ECO energy-saving mode or MAX(HH) speed mode. The corresponding indicator light will be on.

E. Under “ECO” mode, the compressor is running at low speed to save energy. When working in “MAX” mode, the compressor is running at high speed, and the power consumption will increase. It is recommended to start the MAX mode when rapid colling is needed or the freezing temperature needs to be as low as -20°C.

13. About

Press M to start-up interface, “About” as：

About

Automatic Water Sampler

Hardware Number：

Product Number：

Usage Counts：

14. Temperature Controller：

Heating Mode Setting

Note 1：Start up temperature < Stop temperature The program will automatically turn on the heating mode.
Note 2: The model 2100 uses a dual zone temperature controller. The RED display shows the sample chamber temperature and is used for programming the temperature of this location.

The BLUE display shows the temperature of the pump enclosure and is used for programming the temperature of this location.
Note 3: The temperature for the sample chamber is set to operate from 2.5ºC (heater ON) to 4.0ºC (heater OFF). The pump enclosure heater is set for an operating range of 5ºC to 10ºC. Typically, there is no reason to change these setpoint except when the sampler is used in extremely low ambient temperatures.
Set up：
1. Long press the ▲up button until the screen flashes. Then press the ▲ up or ▼down button to set up the Startup temperature.
2. long press the ▼ down button until the screen flashes. Then press the ▲ up or ▼ down button to set up the Stop temperature.
For example：
How should I set it up if I want to stop heating at 4℃, and start heating again when temperature drops to 0℃
1. Make sure it is in heating mode, Startup temperature < Stop temperature
2. Long press the ▲ up button until the screen flashes. Set Start temperature to 0℃.
3. Long press the down▼ button until the screen flashes. Set Stop temperature to 6℃

15. Error Codes

When the compressor, module, fan, or temperature sensor fails or the input voltage is too low, an error code will be displayed on the control panel. When the compressor stops working. When the system is activated for 3 minutes after the fault is eliminated, the refrigerator will enter the normal working mode. The corresponding error code, problem and solutions as follows:

Error Code	Problem	Solution
Er 0	Temperature sensor is damaged	Check or change the temperature sensor if necessary.
Er F1*	Input voltage is too low	Check the voltage, lower down the voltage protection level.
Er 2	Fan protection	Check the cooling fan.
Er 3	Compressor protection activated	Disconnect the power, let it stand for 30 minutes and then restart.
Er 4	Compressor rotating speed abnormal	Adjust the compressor rotating speed by adjusting the voltage protection level.
Er 5	Temperature of control panel is too high	Take the refrigerator to a ventilated place and wait for the control penal temperature to lower down before restarting.
Er 9	Temperature sensor has poor contact	Reconnect the temperature sensor wire or replace the sensor if the error persists.

- **Correcting F1 Error:**

When operating the unit on solar panel or battery only, the unit may display the F1 error code when the operating voltage drops below a certain set point. To accommodate this, use the following steps.

Press the Setup key 2 times to enter the voltage protection mode. The display will show HI, NED or LO. Press the up or down arrow key to change the setting. For solar panel or battery only, operation set the protection level to LO.

16. Model 2195 Solar Battery Charger and Maintainer (Optional)

If you purchased the optional model 2195 solar panel option for your sampler read the following section to setup the panel.

Note: The model 2195 solar panel battery charger is not designed to power the Model 2100 or 2150 as a stand-alone power source. It must be used in conjunction with a properly sized battery. An M25 or M27 deep cycle marine battery is recommended.

The solar panel that is provided with the 2195 package is a high efficiency unit that has been designed to absorb a wider spectrum of sunlight as compared to conventional solar panels. You will find, that even on cloudy days, the panel will generate sufficient power to keep the battery in a fully or close to fully charged state.

Unlike other solar panels that require a separate charge controller, the 2195 unit comes with a MPPT (Max Power Point Tracker) charge controller built right into the panel. The MPPT technology will generate 20-30% more power than the more common PWM (Pulse Width Modulation) controllers. The charge controller incorporates a “Smart” three stage charging algorithm for improved battery charging and maintenance. The controller will prevent full over-

charge, reverse charge, and short circuit protection for the battery.

This technology is designed to intelligently manage the charging of the battery while protecting the battery from damage due to over-charging.

The built-in charge controller is equipped with LED status indicators that lets the user know the charging status of the battery as well as diagnostic information should any issue arise.

The panel itself is a high efficiency poly crystalline composition. The solar cells are protected by tempered glass and is supplied in a rugged aluminum frame for years of reliable operation. The panel is rated IP-65.

How to install the 2195 solar panel:

1. Assemble the adjustable gimbal assembly and mount the base with the provided wing screw.

2. Make sure the location you select for the panel is sturdy enough to support the panel. Use a marker to mark the holes on the surface you want to mount the panel to. Select the proper size bit and drill out the holes at the marked location. Insert the anchor screws and tighten appropriately.

3. Attach the support bracket to the solar panel frame. Line up the holes on the fame and bracket and secure with the M6 provided screws.

4. Install the support bracket with the solar panel to the gimbal mount and secure them with the provided wing screw. Make sure all screws are tight.

5. Adjust the solar panel to the desired direction, typically in a southerly direction. Inset the short side of the provided Allen wrench into the set screw inside the gimbal. Ensure the set screw is tight to prevent the panel from slipping out of the desired position.
6. The Model 2195 comes with three different cable kits. Select the kit that works best for your application. Attach the cable to the battery, observe the polarity to avoid reverse connections.

7. This completes the assembly and installation portion of the Model 2195.

Status Indication

	LED Color	Current Status	Flash Hz	Function

LED Indicator	Green	Flash	1 Hz	Sunlight is sufficient (Battery not connected)
		Off	None	No Output
	Red	Flash	1-2 Hz	Charging (Actively Charging)
	Green	On	None	Battery is fully charged
	Red	On	None	Reversed connection/Short Circuit

Technical Specifications

Rated Power Output	10 W
Power Tolerance	+/- 5%
Operating Voltage	18 V
Operating Current	0.56 A
Open Circuit Voltage (Voc)	21.6 V
Short Circuit (Isc)	0.59 A
Trickle Charge Current	0.2 A
Floating Charge Voltage	13 V
Overcharge Protection Voltage	14.1 V
Current Temperature Coefficient	0.05% / ºC
Voltage Temperature Coefficient	-0.37% /ºC
Power Temperature Coefficient	-0.45% / ºC
Operating Temperature	-40 ºF (-40 ºC) to 185 ºF (85 ºC)
Maximum Snow/Wind Load	0.35 PSI (2400 Pa)
Cable Size/Length	18 AWG/ 9.84 ft (3M)
Rating	IP-65
Panel Measurements	9.25” (235 mm) x 13.75” (350 mm) x 0.70” (17mm)

Note: If testing of the solar panel is required, it must be evaluated with the battery connected. Due to the use of MPPT charger technology, the output of the panel under no load will be 0.00 Volts and 0.00 Current.

Warranty

Vortex Technologies Inc. warrants products of its own manufacturer to be free from defects in material and workmanship, when installed according to the instructions provided by Vortex Technologies, Inc. and used under normal conditions and service for a period of one year from the date of shipment, provided notice is given within the warranty period. Vortex Technologies will repair or replace at its option products found to be defective upon return to Vortex Technologies, Inc. Since Vortex Technologies has no control over the installation, use, or operating conditions of its equipment, all liability on the part of Vortex Technologies, Inc. is limited to the foregoing. Buyer, by supplying Vortex Technologies, Inc. with a valid purchase order or by acceptance of the product, agrees that Vortex Technologies, Inc. shall not be liable for special or consequential damages of any nature or for transportation, installation, adjustment or other expenses which may arise in connection to such product or part or use thereof.

Warranty Service

Direct all warranty and repair inquiries/request to Vortex Technologies, Inc., Service department. Phone (630) 466-9555. Before returning any products, please obtain a return materials authorization (RMA) number by contacting the service department. The designated RMA number should be noted on all shipping paperwork and marked on the outside of the return package.

To avoid processing delays, please be sure to include the following:
1) Company
2) Shipping and billing addresses
3) Contact Name and Phone number
4) Model and Serial numbers
5) A description of the problem or observations

Ship pre-paid to:
Vortex Technologies, Inc.
1861 Old Granart Road
Sugar Grove, Illinois 60554
USA

Rev: D 11/21

Packing List

1. Enclosure	1
2. Suction Tube	1
4. Suction Tube Filter	1
5. Polycarbonate Sampling Bottle	1x7500ml
6. Operation Manual	1
7. Cleaning Kit	1
8. DC power cord	1
9. AC power adapter	1