



WATERBOX 2.0



CBTECH®

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QUICK START GUIDE

Refer To The Following Pages For Detailed Instructions

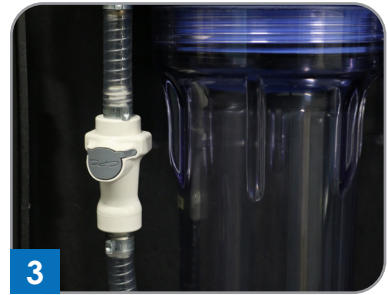
Hose Connections



1 Connect 25' (7.6 M) Inlet Hose



2 Connect Float And Place In Water Source



3 Connect 10' (3m) Outlet Hose

Power Connections

AC Power



1 Connect 110V / 230V GFI Plug To AC Power Cable



2 Connect GFI Plug To Power Source



3 Press "TEST" Button To Verify GFI Function, Then Press "RESET"

DC Power



1 Connect 12V / 24V DC Power Cable

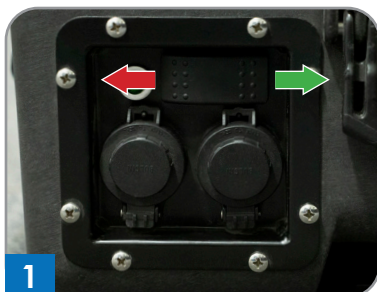


2 Attach Power Cable To Battery

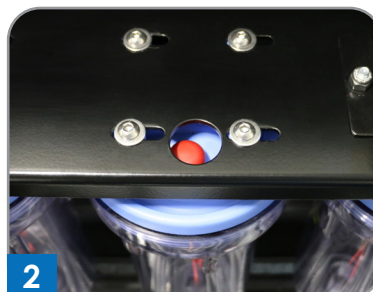


3 Or Use 12 VDC Cigarette Lighter Adapter

Hose Connections



1 Switch **To Left** For DC Power
Switch **To Right** For AC Power
Switch To Center For Off



2 Depress Red Button To Purge Air From Each Housing



3 Use Outlet Valve To Control Water Flow

Scope

The CB Tech WaterBox™ is designed to remove bacteria, viruses, cysts and other contaminants from natural water sources such as surface waters (lakes, rivers, etc.) and groundwater. This manual describes how to install filter cartridges, start the system, monitor and maintain the system and how to shut it down. It is important that the user is familiar with the entire contents of this manual to ensure that the CB Tech WaterBox™ is operated safely and properly.

Principle of Operation

The CB Tech WaterBox™ filtration system creates clean drinking water exceeding potable water standards. The CB Tech Nanomesh™ filters employ a combination of adsorption and size exclusion to remove microbial pathogens and reduce chemical contaminants from the input water stream. Water is cleaned as it passes through the filters; no chemicals, UV light, or heat are necessary.

The CB Tech WaterBox™ has been tested by NSF International and received a letter of compliance from the United States Public Health Command certifying it has met the straight requirements of protocol 248. The CB Tech Waterbox removes over 99.9999% of bacteria, 99.99% of viruses, and 99.9% of cysts. Additionally, the CB Tech Nanomesh™ filter media used in the CB Tech WaterBox™ has been shown to remove or reduce a variety of other biological and chemical contaminants (see Appendix A).

The CB Tech Nanomesh™ Stage I filters are specifically designed for removing organic compounds and suspended solids from source water. When properly monitored and maintained, they protect the CB Tech Nanomesh™ Stage II filter and extend its operational life.

List of Symbols & Abbreviations

°F – Degrees Fahrenheit	cm - Centimeter
°C – Degrees Celsius	kg – Kilogram
gpm – Gallons per minute	GFI – Ground fault interrupter
lbs – Pounds	psi – Pounds per square inch
A – Amps	in – inch(es)
VDC – Voltage - direct current	ft – foot/feet
VAC – Voltage - alternating current	

System Overview

The Components Of The CB Tech WaterBox™



Item	Description	Item	Description
1	Clean Water Outlet Port	11	Hose Intake Adaptor
2	Nanomesh™ Stage II Filter	12	Filter Housing Wrench
3	Nanomesh™ Stage I Filter #1	13	Hose Intake Float
4	Nanomesh™ Stage I Filter #2	14	12 VDC/24 VDC Power Cable
5	Dirty Water Intlet Port	15	120 VAC GFI Plug
6	Pressure Gauge	16	230 VAC GFI Plug
7	Pump Intake Strainer	17	Source Water Inlet Hose
8	Pump	18	One-way Valve Assembly
9	Spare Filter Cartridge Storage	19	Clean Water Outlet Hose
10	12 VDC Cigarette Lighter Adapter		

Technical Specifications

System		
System Weight	Dry	51 lbs (23.1 kg)
	Wet	63 lbs (28.6 kg)
Exterior Dimensions (L x W x D)		24.8 in x 19.7 in x 11.9 in (62.9 cm x 50 cm x 30.2 cm)
Electrical Requirements	Voltage	12/24 VDC or 120/230 VAC
Maximum Height Above Water	Priming	8 ft (2.4 m)
	Operating	20 ft (6.1 m)
Safe To Run Pump Dry?		Yes
Temperature range	Dry Storage	-40 - 140°F (-40 – 60°C)
	Operating	33 – 115°F (0.5 – 46°C)
Nanomesh™		
Contaminant Removal Ability		See Appendix A
Operating Water Source Temperature Range		40 – 104°F (4 – 40°C)

Using the CB Tech WaterBox™ Filtration System

Unpacking

1. Upon receipt of the CB Tech WaterBox™, inspect the unit for any sign of damage that may have occurred during transport. If damage is found, please report this immediately to the shipping company and CB Tech.
2. The CB Tech WaterBox™ comes with all of the parts necessary to filter natural water sources. Please confirm that it has the following parts:
 - 20' of 3/8" wire reinforced intake hose
 - 10' of 3/8" wire reinforced outlet hose
 - (2) CB Tech Nanomesh™ Stage II filter cartridge (1 installed, 1 spare)
 - (4) CB Tech Nanomesh™ Stage I filter cartridges (2 installed, 2 spare)
 - (1) 12 VDC/24 VDC power cable/ cigarette lighter adapter
 - (1) 12 VDC battery terminal clips adapter
 - (1) Filter Housing Wrench
 - (1) Float with inlet pipe and anchor
 - (1) Inlet adaptor
 - (1) Operation manual
 - (1) Nylon mesh component storage bag
 - (1) 120 VAC GFI Plug
 - (1) 230 VAC GFI Plug
 - (1) Petrol-Gel O-Ring Lubricant
 - (1) One-way Valve Assembly

Please report any missing parts to CB Tech so replacements can be provided.

Power Connections: Multi-Voltage Power Supply



Figure 1: Multi-Voltage Power Supply

WARNING: Shock Hazard. Do not expose the multi-voltage power supply to water such as rain, snow or spray. Do not operate with power supply cover removed.

WARNING: Explosion hazard. Do not use in presence of flammable fumes or gases.

NOTE: The multi-voltage power supply (Figure 2) contains two voltage converters; one for switching 120 VAC/230 VAC to 12 VDC and other for switching 24 VDC to 12 VDC. Only one voltage converter operates at a time depending upon which input power source is selected. Each converter is equipped with a thermostatically controlled fan which will operate to cool the power supply when needed. The pump is protected from excessive input voltage by an automatically resetting circuit breaker.

NOTE: The multi-voltage power supply converters have the following safety features.

- Electronic overload protection.
- Electronic overvoltage protection.
- Overheating protection.
- Output short circuit protection.

Power Connections: DC Source Voltage



Figure 2: DC Power cable connection

1. When using a DC power source, lift the protective cap for the 12 VDC / 24 VDC connection. Plug power cord into receptacle by aligning detent with plug, inserting into receptacle and securing by twisting the locking ring clockwise.
2. Attach the black clip to negative (-) battery terminal.
3. Attach the red clip to positive (+) battery terminal.
4. Flip power supply selector switch to the 12 VDC/24 VDC power position (to the right) to operate pump.
5. When DC power supply is not in use, flip the power switch to the center position (off) and disconnect the DC cable clips from battery.
6. Remove power cord by twisting the locking ring counter-clockwise, pulling the plug from receptacle and allowing protective cap to close.

CAUTION: Verify power source voltage prior to the connection with the multi-voltage power supply; only connect 12 VDC to 12 VDC input or 24 VDC to 24 VDC input. Improper input voltage may cause damage to pump/power light. If pump runs at an increased speed 24 VDC has been connected to the 12 VDC input.

CAUTION: Verify polarity of voltage connections prior to turning on the system, a reverse polarity connection (positive to negative) may damage power supply components.

CAUTION: Make sure both battery clips are securely connected to battery terminals. Loose connections can introduce excessive voltage drops, which may cause the cables to overheat and could result in equipment damage or fire hazard.

Power Connections: AC Source Voltage



120 VAC



230 VAC



Figure 3: AC GFI Power Connections

1. When using an AC power source select the appropriate GFI plug (120 VAC or 230 VAC). Connect the GFI plug to the AC power input cable by aligning plug detent with receptacle on cable, pushing ends together and then twisting the threaded locking ring clockwise to secure.
2. Plug the GFI plug into an AC power outlet.
3. Cycle the GFI plug to verify its functionality (see below).
4. Flip power supply selector switch to 120 VAC/230 VAC power position (to the left) to operate pump.
5. When AC power supply is not in use, disconnect the GFI plug from the power source.
6. To disconnect GFI plug, twist the threaded securing ring in a counter-clockwise direction and separate the plug from the AC power input cable.

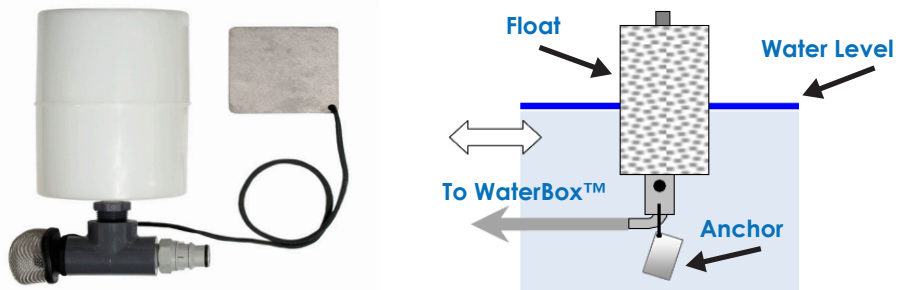
CAUTION: Both GFI plugs require cycling to verify their functionality. GFI cycling is done by pressing the “TEST” button, which should interrupt electrical power to the unit, followed by pressing the “RESET” button to regain function. This procedure must be repeated every time the power source is connected to verify GFI functionality and reduce the possibility of electrical shock hazards for users.

CAUTION: Although the CB Tech WaterBox™ is fitted with GFI plugs for AC operation, which reduce the possibility of electrical shock hazards, the operator should always exercise caution when using an electrical device near water or in wet environments.

Operating the CB Tech WaterBox™

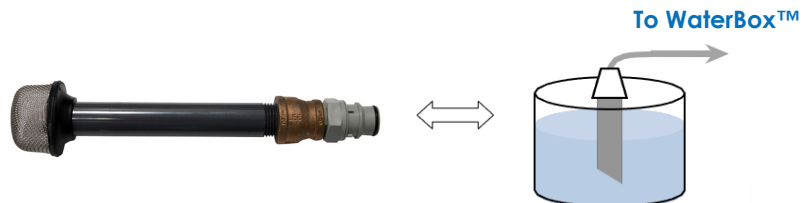
1. Install the two (2) CB Tech Nanomesh™ Stage I filters in the Stage I housings (closest to pump) and the CB Tech Nanomesh™ Stage II filter in the Stage II filter housing (farthest from pump).
2. Choose an inlet device appropriate to the water source. For either option, use the quick disconnect fitting on the intake hose to attach the inlet device to the CB Tech WaterBox™.
 - a. Option #1: Float Intake. Place the flotation device in the water source so that the float is positioned as shown in Figure 4. The float intake is designed to float at the surface of the water source. An anchor with an adjustable lead is attached to the float to accommodate different water depths. This intake device configuration reduces the risk that the system will either draw in sediment from the bottom of the water source or air from the surface.

Figure 4: Schematic of the use of the float intake device



- b. Option #2: Adaptor Intake. The adaptor intake is designed for drawing water from a container or a deep body of water and is positioned as shown in Figure 5.

Figure 5: Schematic of the use of adaptor intake device



3. Visually confirm that the pump intake strainer is in place and free of debris (Figure 6). The pump intake strainer must be in place when operating the CB Tech WaterBox™ to prevent debris from entering the pump and causing damage. The intake strainer may be cleaned by unscrewing the clear cover of the strainer housing, counter-clockwise, and rinsing the screen in clean water.
4. Confirm that the CB Tech WaterBox™ electrical switch is in the “OFF” position and connect it to the power source.
5. Place the discharge hose in the desired location and open the discharge valve to enable the priming process. Flip the power switch (to the left for AC power or to the right for DC power) to turn on the pump and begin priming. If pump fails to prime after 1 min., see troubleshooting guide on page 18.

6. After the pump is primed and water begins filling the three filter cartridge housings, starting with the Stage I filter #1 and moving to the left, depress and hold the red air release valve button at the top of each filter housing (Figure 7) to purge air from the system.
7. After purging all air from the system, allow the system to pump roughly 2 minutes to pass at least 1 gallon of water through the filters before using the cleaned water. This applies to both brand new and previously used filter cartridges.
8. Make a note of the initial pressure reading on the gauge located on top of Stage I filter housing #1. This information will be needed to decide when the filters need to be changed.

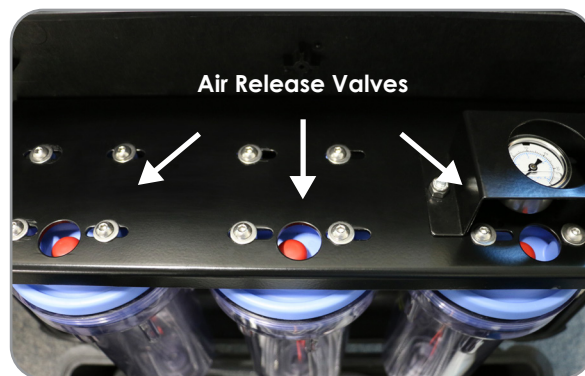


Figure 7: Air release valves on filter housing

Operational Notes

- It is normal to observe a small amount of black powder in the filtrate during the initial flushing period.
- With brand new cartridges, the unit will operate at a flow rate of 0.5 gpm. It is normal for the flow rate to decrease with continued use. The rate at which the flow rate decreases will depend upon the properties of water that is being filtered. Water containing higher levels of suspended solids and/or microbial contamination will cause the flow rate to decrease more quickly.
- When re-priming the pump using wet cartridges, the maximum priming height may be reduced. In this situation, pressing the air release valve button on top of the Stage I filter #1's housing assembly will aid in the priming process (see Figure 7). If this fails, it may be necessary to reduce the vertical distance between the CB Tech WaterBox™ and the water source, or use the one-way valve attachment (Figure 8) to manually prime the system.



Figure 8: One-way valve attachment

- When the vertical distance between the source water and the WaterBox™ is greater than 8', such as a well or steep embankment, it may be required to prime the intake line. A one-way valve attachment is supplied to allow priming from water sources with a vertical distance up to 20 feet. One to two gallons of water at ground level are needed for priming.

Procedure:

1. Disconnect intake attachment from the intake hose.
2. Attach one-way valve assembly to the female fitting of the 20' intake hose.
3. Attach the intake assembly to the one-way valve assembly.
4. Attach the male end of the intake line to the WaterBox™.
5. Place the intake line into the supplied water at ground level.
6. Turn on the WaterBox™, press the pressure relief valve on the first Stage I filter housing to purge the air, and allow the line to be primed. All air must be purged from the line including the internal lines connected to the pump.
7. Turn off the WaterBox™ once lines are primed.
8. Lower intake end of line into source water.
9. Turn on the WaterBox™ and operate normally.

Maintaining the CB Tech WaterBox™

NOTE: CB Tech Nanomesh™ Stage I and II filters must always be used when operating the CB Tech WaterBox™. Operation of the system without a CB Tech Nanomesh™ Stage I or a Stage II filter, voids the stated filtration performance claims.

Changing the Filter Cartridges

1. Position the CB Tech WaterBox™ in normal operating position with the carrying handle at the top and its cover open. It may be desirable to place it on an elevated surface to facilitate cartridge(s) installation.
2. With the suction hose disconnected from the WaterBox™, allow the pump to run until all water is flushed out of the three filter housings. This system flush may take several minutes to complete.
3. Disconnect the electrical power to the system.
4. To remove old cartridge(s), unscrew the clear filter housing by turning the housing clockwise (when viewed from above). If the housing does not unscrew easily, use the plastic filter housing wrench supplied with the unit to loosen the housing. If the system has been used previously, discard the used cartridge(s) and any water that remains in the cartridge housing(s).
5. To install a CB Tech filter cartridge
 - a. Remove the protective plastic wrapper from the filter cartridge(s).
 - b. Apply thin film of Petrol-Gel O-Ring lubricant (included) on both O-Rings (Figure 9).
 - c. Insert cartridge in the housing with the two O- rings toward the top. The cartridge should seat itself easily in the filter housing assembly.
 - d. Rinse any particulate debris out of the filter housing taking care to verify that the threads at the top of the housing are also clear of debris.



- e. Check that the large black O-ring at the top of the housing is in place and free from debris. Apply Petrol-Gel O-Ring lubricant if this O-ring appears to be dry.
- f. Thread the housing back into the filter housing assembly until it is hand tight. Do not force the cartridge or assembly. Typically, it is unnecessary to use the filter wrench to tighten the housing. However, if there are water leaks at the top of a housing once the system is restarted, use the housing wrench to gently tighten the leaking filter housing.

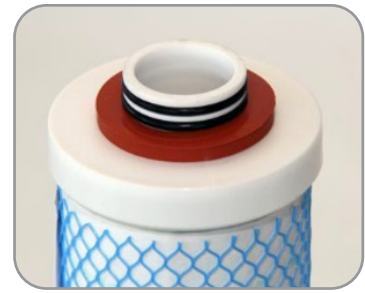


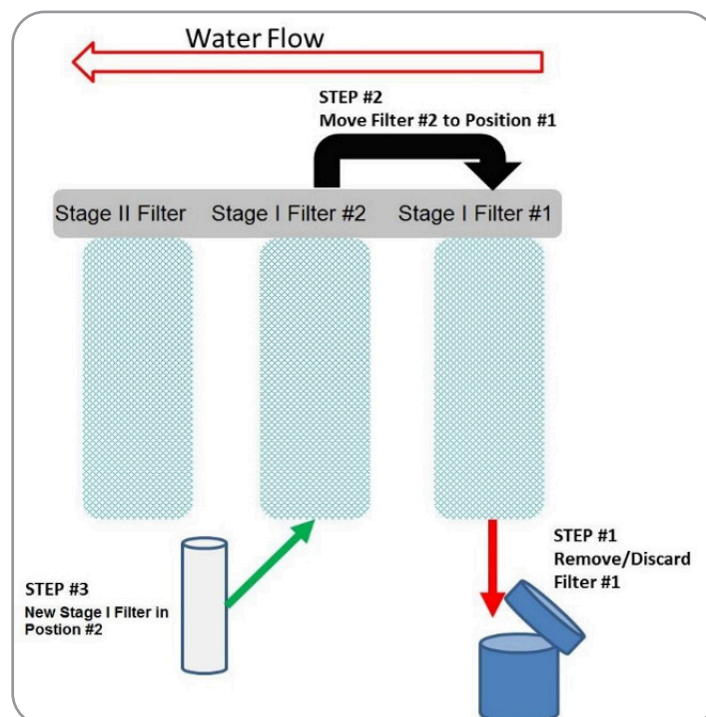
Figure 7: Filter cartridge with O-rings and Silicone Gasket

It is recommended that you record the dates that you install new filter cartridge to help you track the performance of your system.

Filter Replacement Interval: CB Tech Nanomesh™ Stage I Filter

The working life of the Stage I filter in the CB Tech WaterBox™ depends upon the amount of total organic carbon (TOC) and suspended solids in the source water. The Stage I filters should be changed when the system pressure gauge decreases by 10 psi below the initial starting pressure. Therefore, it is important to make a note of the initial pressure reading on the system pressure gauge. A typical initial pressure reading should be in the range of 35-50 psi. Because the first Stage I filter sees the highest particulate and TOC loads, the procedure for replacing filters is:

1. Remove and discard the first Stage I filter,
2. Move the second Stage I filter to the first position,
3. Install a new Stage I filter in the second position.



Filter Replacement Interval: CB Tech Nanomesh™ Stage II Filter

The CB Tech Nanomesh™ Stage II filter should be changed after the Stage I filters have been changed four times.

Causes for System Shut Off

Once the system has been primed, the CB Tech WaterBox™ begins filtering water. There are two conditions that can cause the system to automatically shut off during filtration operations:

Excessive backpressure: The CB Tech WaterBox™ is equipped with a 70 psi bypass valve. If the system backpressure exceeds 70 psi, a valve will open and water will recirculate within the pump. If this occurs, check that the inlet and outlet hoses, pump filter screen and intake adaptor are free from obstruction.

Current surge: The CB Tech WaterBox™ is equipped with a circuit breaker to protect against an electrical current surge. If the circuit breaker trips, turn power OFF to automatically reset the circuit breaker and then back ON to resume operations. If the circuit breaker continues to trip, confirm that the power source is operating at the selected voltage (12 VDC, 24 VDC, 115 VAC, or 230 VAC). If the power source is operating correctly and the circuit breaker continues to trip, there may be a problem with the pump. In this case, contact CB Tech for system service.

System Shutdown & Storage

1. When you are finished using the CB Tech WaterBox™, switch the power to the OFF position and unplug the power cord from the power source. Remove hoses and open valves to allow them to drain. Allow both hoses to air dry completely.
2. If there is any risk of the unit being exposed to temperatures below 32 oF (0 oC) completely drain all of the water from the filter housings and pump as described under the Changing the Filter Cartridges section.
3. If the unit will not be exposed to freezing temperatures and will be used again within 72 hours, the filters should remain in place and water left in the filter housings. The unit should be stored out of direct sunlight.
4. If the unit needs to be stored for an extended period of time, all water should be drained from the system and the filter cartridges removed and discarded.

TROUBLESHOOTING

System Does Not Run

- Check position of power switch on the electrical control box.
- Switch power OFF (to reset a tripped circuit breaker) and then back ON to attempt restart.
- Verify that power source is generating the correct voltage.
- If using AC power (115 VAC/230 VAC), cycle the GFI switch by pressing "Test" button followed by the "Reset" button.
- Disconnect your power source and check for loose pump wiring plug from power supply control box.

System Does Not Prime (No Suction)

- Check height of pump above water source. If height is greater than 8' (2.4m) pump must be manually primed.
- Confirm that inlet hose, outlet hose, and water intake are free from obstruction.
- Confirm that pump inlet strainer is clear of debris. (If clogged, unscrew cap, remove and wash mesh screen.)
- Check all plumbing connections for leaks.
- With the pump turned on, press and hold the air pressure relief valve on the first Stage I filter until the pump is primed.

Waterbox™ Produces Less Than 0.5 GPM Flow Rate

- Verify (via pressure drop) that the filters have not reached their useful life
- Confirm that the suction and discharge hoses are free from obstruction.
- Confirm that all of the air is bled from the system.
- Confirm that the pump intake strainer is clear of debris. If clogged, unscrew clear housing remove debris and (if needed) gently scrub the stainless steel screen.
- Check all plumbing connections for leaks.
- Safely verify that the pump is not overheating.

Appendix

Contaminants Removed by CB Tech Nanomesh

The following table is a list of the contaminants removed or reduced.

Biological Contaminants	
99.9999% of bacteria	
99.99% of viruses	
99.9% of cysts	
Chemical Contaminants	
Heavy Metals (e.g. lead and cadmium)	Chlorine
Disinfection by-products (THMs and HAAs)	Organophosphates (pesticides and herbicides)
Total Organic Carbon (TOC)	Volatile Organic Compounds (VOCs)

Customer Feedback

Detailed feedback from users in the field on the performance of the CB Tech WaterBox™ helps with continued improvements. Please share your experience of using this product with CB Tech along with any suggestions or opinions that would help with future improvements to its operation.

Sales and Service

CB Tech
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sales@CarbonBlockTech.com
866.622.9373

Product Warranty

Carbon Block Technology, Inc. warrants its products to be free from defects in material or workmanship for a period of 12 months from delivery. This warranty does not apply to replaceable parts or components subject to normal wear and replacement.

Unless specifically stated in the applicable contract, the warranty excludes any claims arising from (i) use of the products in a manner not set forth in the written instructions that CB Tech provides with the product, (ii) any modifications or damage to the product not made or caused by CB Tech, (iii) non-compliance with state and local codes or ordinances or other special codes not specifically stated in writing on the purchase document or contract, and (iv) performance or results of the products.

The customer's sole and exclusive remedy for breach of warranty concerning products will be repair or replacement of the defective portion thereof or a refund to the customer, in CB Tech's sole discretion. Parts or components may be replaced as deemed necessary solely at CB Tech's discretion, with the returnable part or components becoming the property of CB Tech, CB Tech would be responsible for any transportation and disposal of these parts, CB Tech does not warrant that products will operate uninterrupted or error free or that non-material defects will be corrected. This warranty does not apply to any defect caused by: failure of the user to provide a suitable operating environment, use of products for a purpose or in a manner other than that, for which they were designed, or any other abuse, misuse, or neglect of the products.

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In no event shall CB Tech's aggregate liability arising in connection with a product exceed the price paid to CB Tech for such product.





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